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[American Sunday School Union]

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Mrs. Alice Tenner
Presentee

By her Father

April 18. 1864

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1. *Papilio Paris*, China.
2. *Catagramma Codomanus*, China

JENNY
AND
THE INSECTS.



AMERICAN SUNDAY-SCHOOL UNION:

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JENNY AND THE INSECTS.

CHAPTER I.

A GREAT UGLY SPIDER.

Jenny. Oh, you great ugly spider! I wish you would not come spinning your web over the window, where I want to hang my bird.

Spider. Well, now, Miss Jenny, I call that polite and reasonable! Perhaps I *am* a great ugly spider in your eyes, though I assure you there is a spider out in the currant-bushes who thinks I am very good-looking indeed. As for spinning my web over your window, I don't know how you expected me to know that you wanted to put your bird out here, —especially as you never did so before.

Now, don't brush it down in a pet, but

look at it a little, and then tell me, honestly, whether you ever saw any thing half so pretty in your life. See how fine, and yet how strong, the cords are! I can hang my whole weight upon a single one of them without danger of breaking it, and yet the finest thread of your nicest cambric handkerchief is rough and clumsy beside it.

And do you know that the very least—"the spider's most attenuated thread," as your brother Harry said last night—is made up of at least four thousand strands? Imagine that, and then tell me whether any human hand or machine could make any thing so fine and at the same time so strong.

Then, as to beauty, see how elegantly the threads are crossed and re-crossed at regular intervals, so as to form a perfect geometrical figure. Notice, as you look across them towards the light, how they take upon themselves all the colors of the rainbow, while the tiny drops of last night's dew that still hang upon them sparkle like little diamonds. Confess, now, whether you ever saw any thing in a jeweller's shop to compare with it.

Jenny. I never did, Mrs. Spider,—that is the truth. It is curious that I never noticed it before, though I have seen spiders' webs all my life. I should like to know how you make it.

Spider. I am very ready to show you, my dear,—if you will only sit still and not shake me, for that discomposes me very much. In the first place, then, I will allow you to look closely at the back part of my body, while I sit on the window-sill and rest a little after my fright. Do you see four very small points, each not larger than the point of a small pin?

Jenny. Yes, I see them. What wee little things!

Spider. Those are my spinners. Each one of them is furnished with about a thousand little tubes.

Jenny. A thousand tubes in that little point!

Spider. Yes, my dear: but don't interrupt me. Out of every one of those little tubes there comes a kind of gum which hardens upon being exposed to the air. Now see how I manage. I am going to fasten a thread to that farther side of the window. I first press

my spinner against the frame and then run off a little way. Do you see how the thread is drawn out?

Jenny. I see. But how will you contrive to get it across without having it stick to the frame? You cannot jump so far.

Spider. Of course not. I am not good at jumping, and, besides, it would probably break my thread. I shall manage much better than that. I take it in this little spur or claw, which you see here on the inside of my foot, and so hold it clear while I run round to the place where I want to fasten it. See, here I am! One pull tightens it; and I fix it firmly at this end, just as I did at the other, by pressing my spinner against the wood. Now, then, I run along this first thread and make another close beside it, and then another, besides strengthening this cable by smaller stay-ropes stretched to different points. Now I carry a thread round to the other side, and pull it tight, so that it crosses diagonally the space I intend to occupy with my web. Then I spin another, and another, fastening them all in the centre and at the circumference, like the

spokes of a wheel. I am going to make about twenty of these spokes.

Jenny. How fast you work! I can hardly follow you.

Spider. Yes; I always get on very fast with this part of my web. It does not need nearly as much contrivance as the ground-plan.

Jenny. Contrivance! I did not know that spiders could contrive: I thought their webs were all alike.

Spider. That shows how people go through the world with their eyes shut. You hardly ever see two webs alike, even of the same kind of spiders. And, besides that, every different species has a general plan of its own. They vary the shape of their webs according to the place they have to work in. Sometimes the foundation is oblong, sometimes square, sometimes six or eight sided. Mine, you see, is a triangle, though I should adopt either of the others if it became necessary. But I have finished the spokes to my wheel, and am going to make the cross-pieces. You see, I go to the middle, where the spokes are near together, and, by stepping lightly from one to

the other, I spin several circles one within the other, glueing each one to the foundation-thread, and thus produce that pretty figure you have often seen. Finally, I run to the centre and bite out the little cottony tuft which united the threads at first, and my work is done.

Jenny. But it seems to me that you have left out one thread.

Spider. Indeed! where?

Jenny. There, between the tenth and the eleventh, is a space twice as wide as any of the others.

Spider. Oh, we always do that. It is a kind of fashion among spiders.

Jenny. But, Mrs. Spider, suppose it should rain: what would you do? This open web would not shelter you in the least. Indeed, I think a heavy shower would break it down, and then what would become of you?

Spider. A very sensible question, though I would not be willing to answer it to everybody. Just look under the window-sill, and you will see that I have made a snug little covered apartment, to which I can retire

when the weather is unpleasant or any danger threatens, and be out of harm's way.

Now, while I am waiting for some fly to come along for my luncheon, I am quite ready to gossip with you about my habits and those of my relatives, as long as you care to hear me.

Jenny. Thank you, Mrs. Spider; I shall like that very much. But I am sorry you are going to make your luncheon of a poor, harmless fly.

Spider. Oh, they are poor, harmless flies now, are they? I suppose, then, you are not the same sleepy little girl that I heard fretting early this morning because the flies would not let her have any peace. You do not think they are so very harmless when they get into your bread-and-milk, or spot your drawing and your clean collars, besides tickling your nose and eyes so that you spend half your time in brushing them off. And, besides, you are intending to make your dinner of a poor harmless chicken, or a lamb perhaps, without once thinking whether there is any cruelty in that. I was made to eat flies, and I only kill enough to satisfy my needs. But

now let me tell you some curious things about myself. I have eight large eyes upon different parts of my head; for, as I cannot move them, I need a large number to see what is going on around me. My face is furnished with two pincers or cutting jaws, which are my weapons. They are indented like a saw, and each end in a strong claw like a cat's, with a very small hole near the end, through which escapes the poison with which they are furnished. When they are not in use I double them up like a clasp-knife. Besides my eight legs, I have two arms, which I use in holding and turning about my food. So you see I am a pretty formidable creature to those of my own size, though I could not hurt you much.

Jenny. But tell me, now, are not spider-bites poisonous?

Spider. It is often said so; but, unless the blood is in a very bad state, a spider-bite is no more than the sting of a bee. But, as even a bee-sting is unpleasant, I would advise you to let us alone, and we shall certainly let you alone. There seems no very clear proof that the bite of any spider is sufficiently poisonous to

produce death, through some terrible stories have been told about them.

Jenny. I should like to hear some of those stories, if you please.

Spider. Certainly, my dear. It used to be said that a spider found in Italy, called the tarantula, was so poisonous as to produce death immediately unless the proper remedy were at once applied; and, strange to say, this remedy consisted in music and dancing. The neighbours collected, and formed a circle around the unfortunate sufferer, who usually appeared in a stupid state at first till the music began, which always consisted of a particular lively air. As soon as this was heard, the patient raised his head, got upon his feet, and began certain curious motions of the limbs and body, keeping time to the music. At first the dance was slow and solemn, but it gradually increased in quickness and violence till one would think the body would be shaken to pieces. After continuing this exercise till he was perfectly exhausted, the patient sunk down in a kind of swoon, from which he awoke cured! This story was believed for

a long time, though numbers of scientific people examined into it. Those who had a curiosity to see the performance, hired some one to allow himself to be bitten, and paid for the music and refreshments for the performers. I believe it is now generally admitted to be an imposture kept up for the purpose of making money.

A spider spinning a web so fine as almost to be invisible, and inhabiting the cork-forests of Morocco, is said to be so venomous that its bite causes death in a few hours. It is described as being as large as a hornet, but rounder, and more sluggish in its movements.

In the island of Elba, in the Mediterranean, are found spiders much dreaded by the natives, as they declare that their bite is very dangerous and even fatal. But the worst of all would seem to be a very small red spider, found in South America, which is so poisonous as to cause death almost immediately,—not, however, by its bite; for it is said to be perfectly harmless, unless crushed upon the skin, in which case it produces large swellings, which soon destroy life. This terrible little creature is called

a *coya* by the natives, and is much feared by them. They pretend to say that the only way the swellings can be cured is by swinging the patient over the flame of long grass or straw, after which there is no danger. Mind, child, I do not say that this is a true story; though I understand it has been repeated by celebrated travellers. But, talking of poisonous insects, perhaps you have heard of the scorpion?

Jenny. I think I have seen a picture of it. It is shaped like a lobster, is it not?

Spider. Yes, a good deal, though much smaller. I never heard of one more than ten inches long, and I believe that is a very uncommon size.

Jenny. But is the scorpion an insect?

Spider. It is usually classed among insects, though of late, I understand, they have been placed in an order by themselves, together with spiders, crabs and lobsters. At any rate, it is a connection of mine, and is formidable enough. As you said, it resembles a lobster in form, and its tail is armed with a sting, which is usually turned over its back. It is a fierce and brave creature, and will often suffer itself

to be destroyed before it will retreat. It is said that, when it is surrounded by a ring of fire and can see no way of escape, it will sting itself to death. It is much more venomous in warm climates than in cold, and, while in Europe its sting does not produce very serious consequences, in India and South America it often causes death,—particularly in children. It is fond of warmth, and often creeps into beds and under pillows, so that it is necessary to examine those places very particularly before retiring. The sting is a hard, sharp point, curved something like a sickle, and furnished with two or three holes for ejecting the poison, which looks like thick milk.

Jenny. What ugly creatures! I am glad there are none in this part of the world. It must spoil all one's comfort to be obliged to keep a look-out for snakes and scorpions and such things all the time. But, to come back to our own window: do all spiders spin webs?

Spider. No, not all. A certain family of spiders are called vagrants, because they have no fixed home, but wander about and seize their prey wherever they can find it. You

may often see these wandering spiders basking on the sunny side of a brick or stone wall. When you startle them, they seem to move as well one way as another,—backwards, forwards or sideways, it is all the same to them,—and they can spring to a considerable distance with great quickness. One solitary spider makes a den of a rolled-up leaf and springs out upon its prey. Another lurks in the bottom of a flower-cup and catches unwary insects who come after honey. Many hide in the rough bark of trees and the chinks of walls, while still others will pretend to be dead till their game comes along, when they come to life quickly enough, and spring like a tiger upon the luckless fly, who perhaps has been rejoicing in the death of his enemy. There is a very large spider which lives in South America and the West India Islands, and which has been said to catch birds, especially humming-birds,—though this has been disputed, I understand.

Jenny. I should think it might be disputed. A spider big enough to catch a bird! It would be a sight, indeed.

Spider. Oh, he is big enough, if that is all. His body is two inches long, and his legs cover a space a foot in diameter. This spider does not spin a web, but builds a very curious house in the ground. In the first place he digs out a tunnel in a steep clay bank. This tunnel is about a foot in length and an inch across. The next thing is to line this apartment with a fine curtain of dark-coloured silk, which serves the double purpose of giving it a smooth surface and preventing the walls from falling in. To this curtain he fastens the door of his house.

Jenny. The door! You don't mean a real door?

Spider. A real door, with hinges and a fastening. It is made of several alternate layers of silk and sand glued together. It is very strong, as smooth as marble upon the under-side, and exactly fits the mouth of the hole, to which it is fastened by a strong hinge. Thus he has a very pretty house, where he lives securely with his wife and twenty or thirty children; for spiders are very affectionate in their own families, though, I confess, they treat

intruders rather roughly, even going so far sometimes as to eat them up.

You may knock as hard as you please, and Cousin *Mygale* takes no notice of you; but attempt to force the door open, and he is roused: he runs to the spot, and, seizing hold of the fastening with claws and teeth, he braces himself against the walls and holds on as if for his life. Should the door be opened in spite of his efforts, he retreats sullenly to the bottom of his den and makes no further resistance; but, if no other insult is offered, he sets to work, and by morning constructs a new door as good as the first. These spiders hunt only at night, and drag their prey to their dens, where they feast at leisure.

Jenny. I never heard any thing so curious. Are there any other spiders who make houses?

Spider. Yes; another cousin—*Aranea aquatica*—constructs a still more beautiful one at the bottom of a piece of still water.

Jenny. She must have rather a damp house.

Spider. Not at all. She manages much better than that. She first spins quite a number of long threads, which she attaches to different

water-plants as a framework for her building. Over these she spreads a coating of varnish, which, hardening in the water, forms a membrane as transparent as glass, very elastic, and perfectly water-tight. But she cannot live without air: so she attaches to the lower part of her body a bag of the same material. Then, coming to the surface, she inflates her bag with air and plunges down to her glass palace,—an operation which she repeats as often as is necessary to procure a fresh supply. Thus she has a house ready furnished in the water, dry and comfortable, from which she emerges to catch her prey. Then she lives part of the year alone, and the rest of the time with her husband, who assists her in hunting and in taking care of their eggs, which have a nice silken bed, to themselves, all in one corner.

Another very large water-spider forms a raft by weaving and glueing together bits of weed and leaves in the shape of a ball. Upon this he boldly sets sail, and when he sees an insect floating in the water he approaches and devours it. When any danger threatens he retires under his raft.

Jenny. Well, I am sure I had no idea you were such curious little creatures. I mean to watch you hereafter, and try to see some of these wonderful things. But you said spiders were affectionate among themselves.

Spider. Yes; especially are we fond of our eggs and young ones. You must have often seen our bags of eggs suspended in our nets, and you may have observed that it is rather difficult to make us run away from them. There is a rather common garden-spider which lives under clods of earth and carries her eggs attached to her body in a white silk bag about the size and shape of a small pea. This bag she carries everywhere with her. Nothing but overpowering force will make her quit it; and even if it be torn from her body she will seize it with her jaws and hold on with all her might. But if it be destroyed she is so overcome with grief as to remain stupid and immovable, and will allow herself to be taken and killed without the least resistance. As soon as the young ones are hatched, they cluster all over the body of their mother, so as to make her appear twice her

usual size. In this way she carries them about and feeds them until they shed their skins the first time, and then they are able to take care of themselves.

Another field-spider spins an elegant little tent, of several thicknesses of silk, which she attaches to a stone. In this she lays her eggs, and her young inhabit it till they come to weeks of discretion, their kind parent supplying them with food and watching over their safety.

Jenny. Do spiders shed their skins? I did not know that.

Spider. Yes, we shed our skins several times before we arrive at maturity. You may often see our cast-off clothes hanging in corners.

Jenny. I have seen them, but I thought they were spiders which had been starved.

Spider. Oh, my dear, it is not an easy matter to starve a spider. We can go without eating for many days, and even months, without suffering much,—though we are always ready for a good meal when we can get it. We are very persevering, too, and may even

be called obstinate,—for you may have observed that it is very difficult to drive a spider away from any place when it has once taken possession.

Jenny. Yes, I know that by experience. For two months a spider has persisted in spinning a little web in the corner between the looking-glass and the parlour-window. Every morning I brush it away, but I always find it there the next day. He seems never to have caught a fly there, and why he wants to stay I cannot guess. And, by-the-by, you have not told me how you take the flies. I should think they would get out of this web easily enough.

Spider. So they would, if I did not hinder them; but the moment a fly is caught I rush out and wind him all up in a strong cord which I spin for this purpose. As soon as this is done I give him a good bite, which is all that is necessary. Sometimes a blue-bottle fly or a moth will give me a good deal of trouble; but I conquer at last, though at the expense of some damage to my web.

Jenny. But suppose a wasp or hornet should get caught: what then?

Spider. Why, then I should run out as quick as I could, bite off the threads which confined him, and let him fly,—which he is usually glad enough to do, for we know each other's strength, and do not care to risk a battle. If I were very hungry I might try to entangle him, but not otherwise.

Jenny. Well, Mrs. Spider, I am very much obliged to you for your entertaining stories, and I shall hereafter think of you and your family with much respect. Good-morning to you.

There is in South America a kind of large black spider, ornamented on the back with ruby-coloured marks, which is social in its habits. These spiders live in separate nets, which are attached to the bushes and to each other by strong cords, and which occupy large spaces in the woods. D'Azara, a celebrated traveller in South America, says that they make a central nest, as large as a hat-crown, and all deposit their eggs in it. I am not aware that any social spider exists in this country.

Another South American spider—the *Epiera*—

makes use of a singular artifice for escaping from its enemies. When disturbed, it violently jerks the net, which is attached to elastic twigs, till the whole acquires such a rapid vibratory motion that the body of the spider becomes indistinct and almost invisible. The lamented Hugh Miller notices the same trait in a Scotch wood-spider. A small and very pretty spider lives as a parasite upon the web of the great *Epiera*, which graciously allows his little friend to subsist upon the small insects which are caught by adhering to the lines.

CHAPTER II.

A NICE LITTLE HOUSEKEEPER.

Jenny. WELL, Mr. Ant, I am glad to see you here again. I quite missed you.

Ant. I am much obliged to you for thinking of me, Miss Jenny; but I have not been away since the last time I had the pleasure of meeting you.

Jenny. But I have seen nothing of you since last October, though I have come to the nest to inquire for you several times. There did not seem to be any one at home, and I thought the family might have removed to a warmer climate during the cold season.

Ant. I assure you, Miss Jenny, I have not stirred from this spot since last fall, until yesterday, when I came out for the first time, and we began our spring house-cleaning and repairs, which, you see, are progressing very actively.

But it is not the custom for ants to go out or to receive company in winter, and as soon as cold weather comes on we shut up our doors and retire to the interior of our houses till the next spring.

Jenny. I should like to see the interior of one of your houses.

Ant, (in great alarm.) I hope you will not think of examining one of them, Miss Jenny. It would afford *you* very little gratification in comparison to the injury it would inflict upon *us*.

Jenny. Do not be disturbed, Mr. Ant. I have not the least idea of digging up your nice nest and spoiling all your walls and galleries. I think that would hardly be fair, after the amusement you have so often given me. But I should be very glad to have you tell me something about them, if you have no objection.

Ant. I hardly know how to describe them to you, my dear. We build almost entirely under ground, excavating arched chambers, sometimes round or oval, sometimes quite irregular in shape, but all well smoothed and hard

finished. These are connected by galleries of a very good size, compared with the magnitude of our bodies. Some of our nests are three or four feet deep, and occupy a large space, like this one, which, you see, has several different entrances.

Jenny. I did not suppose that all these doors belonged to the same nest.

Ant. We should not allow of such near neighbours, I assure you. Ants like a great deal of room to themselves. Other species of ants make their nests entirely above ground, and even in trees, though I believe these last are only found in hot countries.

Jenny. I should like to hear something about them, if you are not too busy to talk to me.

Ant. Oh, I have nothing to do at present. This is my resting-time, and I am glad to enjoy it, for I was working all night.

Jenny. Do you work at night?

Ant. Sometimes, when it is moonlight and we are very busy. At this time of year especially, when storms are frequent, we are glad to avail ourselves of every hour of dry weather;

for we cannot work in the rain. I had my turn last night and am resting this morning; so I am at leisure to answer all your questions as far as I am able. The nest of the *Formica rufa*—or the horse-ant, as it is sometimes called—consists, like our's, of a great number of cells and galleries, but with this difference,—that about half their apartments are above ground, and they transport their young ones from the upper to the lower stories when it grows cold, and back again when the sun shines out. Their doors are open all day; but they vary their form and size according to the weather, and at night close them entirely, retreating to the interior of the hill and leaving only a few sentinels on guard. They also keep them shut upon rainy days. Another ant builds his nest wholly of earth. It consists of a great number of different stories,—sometimes as many as forty,—half below the earth and half above. The former are placed one above another, but the latter are concentric.

Jenny. What do you mean by concentric?

Ant. One within another, like a nest of boxes or the coats of an onion. The lower

ones thus are concentric. They consist of large arched rooms, long saloons and still longer passages. These passages in some places meet in one large apartment, and in others they come out into the large roads which lead off a long way under ground.

Jenny. How far?

Ant. Oh, three or four feet. That is a long way for an ant, you know. These ants work only after sunset, and are very industrious and ingenious. Their walls, pillars and arches are all made of soft clay well worked and tempered; and, while a shower is a great inconvenience to us, it is a real advantage to them, as it softens the earth and makes it easier to manage. Each ant brings in his mouth a morsel of clay and joins it to the rest, smoothing it with his jaws or mandibles and patting it with his fore-feet, so as to form a hard, even surface. They are very careful in laying out their plans, erecting their partition-walls and covering them in with well-shaped arches, setting up pillars and performing all the work of experienced masons. There are other ants that excavate dwellings in wood with a great deal of care.

(*One of the ants just at this point runs up to the speaker, and, after patting him on the head with his feelers, hurries away.*)

Jenny. What did your friend do that for?

Ant. He told me, in the ants' language, that there was a lump of sugar lying in that flower-pot, and advised me to go and help myself before it was all eaten up.

Jenny. Did he say all that with those motions? I did not hear him make any noise.

Ant. We never make a noise when we talk. It is all done by signs.

Jenny. And can you make each other understand any thing you please in that way?

Ant. You will see. Here comes an ant who has not heard any thing about the sugar. I will tell him of it. (*He makes signs to the third ant, who scampers away in the direction of the flower-pot.*) You see he understands me at once. We give all our directions about work and manage our household affairs in the same way. By these signs also our sentinels give warning of approaching danger.

Jenny. But why do you not go and share

in the feast with the others, Mr. Ant? Do not let me detain you if you wish to go.

Ant. Thank you; I do not care for it. I am going to milk one of our cows by-and-by.

Jenny. Sir!

Ant. I am going to milk one of our cows, I say. What is there surprising in that? Your father keeps several cows, does he not?

Jenny. Why, yes. But ants!—Pray, how large are your cows?

Ant. They are very small,—not quite so large as we are ourselves. Just turn up the leaves of that rose-bush. There! Do you not see a number of little pale-green insects?

Jenny. Yes; I have often seen them before. Thompson calls them plant-lice. He says they are mischievous little creatures and do a great deal of harm to the shrubs.

Ant. Well, however that may be, these aphides, or plant-lice, are our little cows, and yield us an abundance of nice milk as sweet as honey. Sometimes we keep them, as you see, on the branch of a neighbouring plant or shrub, which is then considered as their pasture and carefully guarded from intrusion. I have

known of a wall of clay being built around the stem of the plant for their protection. Very frequently they live in the nest with us, feeding sometimes upon the roots of the plants around us, and sometimes upon the provisions we carry in for them. We take great care of them and of their young, keeping their eggs in the warmest part of the nest, in order that they may hatch out early and so supply us in the spring. Some of our cousins abroad keep a kind of little beetle for the same purpose. Now I will milk one of them. You see I pat it very gently with my feelers, first on one side and then on the other, when the aphid immediately gives out two drops of a clear sweet fluid, which supply me with a very nice draught. These cows are our most valuable property, and we are exceedingly careful of them. We should fight furiously if any one should interfere with them.

Jenny. So you do fight sometimes?

Ant. Yes, indeed; we have sharp battles, and often leave half our number dead upon the field. These combats sometimes take place between different species, and sometimes be-

tween two colonies of the same species. At such times you may see thousands of ants biting, struggling, wrestling, and overturning each other in the dust, till night puts an end to the combat. It is often renewed the next day, and continues till a violent storm of rain puts an end to the struggle.

Jenny. But what do they fight for?

Ant. Sometimes for one thing, sometimes for another. Perhaps two parties have seized the same spider or earth-worm, or the ants of one hill trespass upon the pastures and seize the cattle of another; sometimes the cause is still more trivial; and, as a general thing, whatever it is, it does not at all pay for the harm done and the distress occasioned by the war. But there are ants who go out to war for the express purpose of making prisoners, which they carry home to their nest.

Jenny. What do they do with them? Not eat them, I hope?

Ant. Oh, no,—not quite so bad as that. But these prisoner ants do all the work of the nest afterwards. The red ants, who are the marauders, start upon these plundering-expeditions

between two and five of the afternoon of a fine day, first sending out ants to explore the neighbourhood of the hill they intend to attack. Upon the return of these emissaries they set out, a dozen ants forming the advanced guard, which frequently wheels about and returns to the rear of the main body. Having reached the colony, they attack it with fury. The ash-coloured ants defend themselves with great bravery, but in vain, for the red assailants are the strongest, and almost always drive them back to their city. This is in turn assaulted, and a breach made in its walls, by which the conquerors march into the interior. In a few minutes they may be seen coming out each with a young ant or an egg in his mouth, with which he hastens away homeward. The ash-coloured ants are taken very good care of by their new masters, and very soon take upon themselves the whole direction of affairs, feeding the young and helping them out of their eggs, laying up and dealing out provisions, and repairing and altering the dwelling at their own pleasure. They even feed their masters, putting the food into their very mouths.

Though they are such fighters, they are very lazy, helpless creatures, and will starve to death rather than wait on themselves, though the food be close by them.

Jenny. What silly creatures! I do not see any of those ash-coloured ants in your nest.

Ant. No; we do our own work, and never interfere with our neighbours so long as they do not trouble us,—though whoever invades us need expect no mercy at our jaws. We nurse our own little ones, lay up our own provisions, and all bear an equal share in the repairs and other necessary labours about the nest.

Jenny. I should like very much to hear about your little ones. I do not know that I have ever seen them.

Ant. You have seen them, though probably you did not know what they were. In their immature or pupa state they look very much like white seeds, or fine grains of boiled hominy.

Jenny. I have seen your friends carry such things in and out of the nest, but I supposed it was only an instance of prudence, and that they were laying up something for food. But

why do they bite off the ends? I have seen them do that sometimes.

Ant. That is to assist the young ant in making its way out. You may have noticed that we take great care of these eggs, moving them from place to place, sometimes laying them in the sun, sometimes carrying them into the interior of the nest.

Jenny. Yes; and I have often wondered what it was for.

Ant. In order that they may have just as much heat as is good for them, and no more. A great part of the duty of the neuters or workers consists in taking care of the eggs and young ones, attending on the queen and leading her about.

Jenny. Then you have a queen, like the English people?

Ant. Not exactly so. Our queen is only the mother of the community, and has no authority whatever over the State. She is, however, treated with the greatest respect and affection by all of us. Wherever she goes, we press round her, offer her food, brush her dress for her, and help her up the steep ascents and through the nar-

row passages. I have seen James and Fanny join their hands to make a saddle or seat and carry you round the garden: in much the same way, two of us join our mandibles and transport our dear mother from place to place. As often as she makes an excursion through the nest, you may see the workers leaving their occupation and showing their pleasure at seeing her by patting her upon the head and breast, and by standing on their hind-legs, laying their fore-feet on each others' shoulders and dancing round her in that position. Whenever she lays an egg it is immediately picked up by a neuter and carried to a place of safety. Perhaps you will think it strange, but even after her death her body continues to be treated with respect and affection for a long time.

Sometimes there are two or three queens in the nest, but they are all very friendly and kind to each other. Indeed, ants in general have a great deal of family affection, and, if any of our number are absent for a time, I think you will say it is quite touching to see the joy with which we welcome them on their return.

Jenny. Does the queen never go out of the nest?

Ant. Never. It would be considered indecorous in the highest degree. Indeed, no sooner is a female ant elected queen than she throws away her wings of her own accord and never stirs out afterwards. I suppose you know that the male and female ants have wings.

Jenny. Yes; I have seen winged ants often. What becomes of the males?

Ant. Oh, they die very soon after they come out. They are helpless, tender creatures, and the first rude wind or storm of rain kills them.

Jenny. See there! What is that upon the door-step?

Ant. Oh, I see. They have found a nice fat spider, which has been killed in some way, and they are going to transport the body to the nest for provisions. It will amuse you to watch them and see how nicely they manage it.

Jenny, (taking a seat upon the door-step.) I hope it is not my old friend Mrs. Spider: but I

sec it is not, for she is gray, and this one is black. What a monster it is!—almost as large as the one she told me of which is said to catch birds. It is not possible that you little ants are really going to carry off that great creature?

Ant. You will see.

Jenny. They are going to try, I really do believe. They have stretched out two of the legs, and are pulling them round with all their might. There they go to another pair. They have actually turned it half round, and are going to the other side to begin again. See! there it goes clear round! Why does that one sit upon the top of the spider instead of helping?

Ant. He is the engineer who directs the operations of the others. You see they have already advanced the body half an inch.

Jenny. How skilfully they manage! They do not seem to get in each others' way or to throw away a particle of strength. But see! there is one running away. He does not seem to like to work with the rest.

Ant. Foolish fellow! He had much better mind his business. It is not the first time he

has shown symptoms of idleness and rebellion, and he will come to a bad end if he is not careful. See! they have brought him back.

Jenny. Yes, but he will not stay: he kicks and fights and hinders the others; and now he is running away again. Two are going after him! How fast he runs! But they have caught him. Oh, what are they doing to him?

Ant, (gravely.) They are cutting his head off.

Jenny. Oh, how cruel! I thought you said ants were always kind to each other. I shall not like them so well after this.

Ant. No, my dear young lady, they are not cruel. They are only fulfilling our laws, which, I confess, are very strict. You saw that they did not proceed to extremities till they had twice brought him back and tried to make him attend to his duty. He knew very well the risk he was running.

Jenny. They have actually cut his head off without any interference from the others, and are going back to the spider. How far they have moved it since the last time I looked at

them! It is almost at the edge of the step: and now they all go behind and push it. There it goes down upon the flag-stones, and they are all running after it.

Ant. And I must go and help them. I have rested now longer than I ought. Good-by, Miss Jenny. I shall be happy to see you again some time and tell you more respecting our affairs.

A number of scientific men have spent much time and pains in examining into the habits and manners of these industrious and persevering little creatures, keeping them for this purpose in artificial habitations, called formicaries. One of these gentlemen—Mr. Gould—made several discoveries in this way; and among others he established the fact that ants not only communicate with each other by means of their feelers or antennæ, but that they have a different set of signals for different purposes. Thus, when a hungry ant wishes to be fed he pats with his feelers the head of one of his companions, who immediately supplies his wants; when they wish to

give the signal for marching, they strike the bodies of their companions, &c. In this way they will give their compatriots intelligence of a newly-discovered treasure of food. Mr. Gould established a colony of ants in a large flower-pot which he placed in a pan of water. After they had become settled in their new habitation, he stretched some bits of thread from the flower-pot to the edge of the pan. It was not long before two or three ants discovered them, explored them, returned and informed their fellows, and soon the new bridges were covered with trains of ants passing to and fro. Mr. Huber the younger, who first discovered the lazy ants above mentioned, tried several experiments upon them, all of which tended to prove that in their pillaging-excursions they were actuated by their hatred of labour. On one occasion he shut up about thirty of the red ants, with some of their eggs and young ones, in a glass box having the bottom covered with earth, and supplied them with an abundance of honey for food. The prisoners made no attempt either to feed themselves or take care of their young, and several of them

actually starved to death with the food before their eyes, rather than take the trouble to help themselves! At last, taking pity on their miserable condition, he introduced a single working-ant. The industrious little creature at once went to his task, dug a proper cell in the earth and placed the young ones in it, fed the remaining red ants, brushed the dust off them, and, in fine, put every thing in order, the red ants remaining passive as before.

A kind of ant found in the West Indies, and called the *chasseur* or hunter ant, is really very useful to the inhabitants, searching all the houses in their way, and effectually clearing them, not only of cockroaches and other disagreeable insects, but also of rats and mice. The account given by Mrs. Carmichael is so interesting that I shall not apologize to my young readers for copying it entire:—

“One morning my attention was arrested at Laurel Hill by an unusual number of black birds whose appearance was foreign to me. They were smaller, but not unlike an English crow, and were perched upon a calabash-tree near the kitchen. I asked the house-negress, who

at that moment came up the garden, what could be the cause of the appearance of these black birds. She said, 'Missus, dem be a sign of the blessing of God: they are not de blessing, but only the sign, as we say, of the blessing. Missus will see before noontime how de ants will come and clear de houses.'

"At this moment I was called to breakfast, and, thinking it some superstitious idea of her's, I paid no further attention to it.

"In about two hours after this, I observed an unusual number of hunter-ants crawling about the floor of the room: my children were annoyed by them, and seated themselves on a table, where their feet did not communicate with the floor. Shortly after this, the walls of the room became covered by them, and they began to take provisions off the tables and chairs. I now thought it necessary to take refuge in an adjoining room, separated only by a few ascending steps from the one we occupied; and this was not accomplished without great care and generalship, for had we trodden upon one we should have been summarily punished. There were several ants

on the steps of the stairs, but they were not nearly so numerous as in the room we had left. But the upper room presented a singular spectacle; for not only were the floor and the walls covered like the other room, but the roof also.

“The open rafters of a West India house at all times afford shelter to a numerous tribe of insects, more particularly the cockroach; but their destruction was inevitable. The ants, as if trained for battle, ascended, in regular, thick files, to the rafters and threw down the cockroaches to their comrades on the floor, who as regularly marched off with the dead bodies, dragging them away by their united efforts with amazing rapidity. Either the cockroaches were stung to death on the rafters, or else the fall killed them. The ants never stopped to devour their prey, but conveyed it all to their storehouses.

“The windward windows of this room were of glass; and a battle now ensued between the ants and the jack-spaniards* on the panes of glass. The jack-spaniards were not quite so easy

* Jack-spaniard is a kind of large wasp.

prey as the cockroaches had been, for they used their wings, which not one cockroach had attempted to do. Two of them, hotly pursued on the window, alighted on the dress of one of my children. I entreated her to sit still and remain quiet. In an inconceivably short space of time a party of ants crawled upon her frock, surrounded and covered the jack-spaniards, and crawled down again to the floor, dragging their prey with them, and doing the child no harm.

“We now left the house and went to the chambers built at a little distance; but these also were in the same state. I next proceeded to open a store-room at the end of the other house for a place of retreat; but to get the key I had to return to the other room, where the battle was now more hot than ever. The ants had commenced an attack upon the rats and mice, which, strange to say, were no match for their apparently insignificant foes. They surrounded them as they had the insect tribe, covered them over, and dragged them off with an activity and union of strength that no one who has not watched such a

scene can comprehend. I did not see one rat or mouse escape, and I am sure I saw a score carried off in a short period. We next tried the kitchen; for the store-room and the boys' pantry were already occupied; but the kitchen was equally the field of battle between rats, mice, cockroaches, and ants killing them. A negro came up selling cakes; and, seeing the uproar, and the family and servants standing out in the sun, he said, 'Oh, missus, you've got the blessing of God to-day; and a great blessing it is to get such a cleaning!'

"It was about ten when I first observed the ants: about twelve the battle was formidable; soon after one the great battle began with the rats and mice, and about three the houses were cleared. In a quarter of an hour more the ants began to decamp; and soon not one was to be seen within doors! But the grass round the house was full of them, and they seemed now feasting on the remnants of their prey which had been left on the road to their nest; and so the feasting continued till about four o'clock, when the black birds, which had never been long absent from the trees in the neigh-

bourhood, darted down among them and destroyed by millions those who were too sluggish to make good their retreat. By five o'clock the whole was over, and before sundown the negro-houses were all cleared in the same way. I never saw these black birds before or since, and the negroes assured me they never were seen but at such times."

Ants seem to understand the value of the saying that

" All work and no play
Makes Jack a dull boy ;"

for not only do they show their pleasure in the company of their queen by the gambols mentioned above, but they seem regularly to devote some portion of their time to relaxation and amusement. They dance and caper on their hind-legs, run races, wrestle, and carry each other on their backs and in their mouths, all in the greatest gayety and good-humour. Thus they not only show forth a pattern of industry to the sluggard, but may also teach a lesson to those over-industrious men of business who pursue their

toil without intermission till health of body and strength of mind alike fail.

Ants have a number of enemies even in temperate climates,—principally among birds, which are very fond of the eggs and pupæ. In Russia and Germany, where many nightingales are kept in captivity, hundreds of bushels of ants' eggs, as they are commonly called, are brought to market for the maintenance of these charming singers. Our old friend the toad never can resist the temptation of devouring them when they come in his way, though he knows very well that they will cost him a severe fit of dyspepsia.

In the hotter climates of Africa and South America they form the subsistence of some quite large animals, so peculiar in their construction and habits as to constitute an order by themselves. These are the ant-eaters. There are some differences existing between the ant-eaters of Africa and those of South America,—the former having a few molar teeth, while the latter are destitute of any vestige of them. The most considerable of these is the great ant-eater or ant-bear of South Ame-



Great Ant Eater of South America

rica, which measures five feet and a half from the root of the tail to the extremity of the snout. The tail is three feet in length, and remarkably bushy. The head is thirteen inches long, and tapers almost to a point. The tongue is round and fleshy, almost twice as long as the mouth,—in which it is kept doubled up with the point turned backwards. The feet are large, the toes of unequal length, and the claws, which are very large and strong, are kept doubled up under the sole, while the weight of the body rests upon the outside of the foot. Its colour is a grayish brown mixed with silvery white.

The habits of the great ant-eater are very slothful and solitary: he is almost always asleep, rolled up in a ball, with his claws locked together, his snout thrust into his fur, and his great bushy tail serving as a comforter to the rest of his body. Notwithstanding his lazy habits, he is hardly ever fat; but, to counterbalance this disadvantage, he has the power of going without food for an incredibly long time. The female ant-bear is very attentive to her cub, and carries it round upon her back

long after it is able to provide for its own wants.

The great ant-bear frequents low and swampy lands, and the damp steaming forests of South America, where he finds abundance of his nimble game. When his appetite becomes strong enough to overcome his laziness, he saunters leisurely to the nearest ant-hill, scratches it open with his powerful claws, and, as the swarms of insects issue forth, he draws his fleshy, glutinous tongue over them and secures as many as he likes. In a country which swarms with ants to such a degree that the hills almost touch each other for miles together, even so leisurely a gentleman as our hero could hardly want for food. When encountered in the woods, he may be driven almost any distance by merely pushing him with a stick. Should he be hurried beyond his patience, however, he turns upon his tormentor, and, sitting up on his hind-legs like a bear, he defends himself with his fore-claws. He is said to be quite easily tamed, and is fed upon bread and milk, mixed with pieces of meat minced small.

This ant-eater never leaves the ground; while the Tamandua, another animal of the same species, never descends to it. He lives entirely on the tops of trees in the thick forests of South America, where he subsists upon ants, termites and bees, which last have no stings and are easily despoiled of their treasures.

The little ant-eater is not much larger than a squirrel, and is a very pretty and interesting animal. It inhabits Surinam, and is called by the natives "kissing hands," as they pretend that, (at least in captivity,) it never eats, but subsists by licking its paws. Von Lark, a German traveller in Surinam, kept two in confinement, and succeeded in making them eat. "When I got the first," he says, "I sent to the forest for a nest of ants, and during the interim I put into its cage some eggs, honey, milk and meat; but it refused to touch any of them. At last the ants' nest arrived; but the animal did not pay the slightest attention to it either. By the shape of its fore-paws, which resemble nippers, and differ very much from those of the other species of ant-eater, I thought this little creature might perhaps subsist on the

nymphæ of bees, &c.: I therefore brought a wasps' nest, and then it pulled out with its nippers the nymphs from the cells, and began to eat them with the greatest eagerness, sitting in the posture of a squirrel. I showed this phenomenon to many of the inhabitants of Surinam, who all assured me that it was the first time they had ever known this animal to take any nourishment."

The ant is mentioned in Proverbs vi. 6, where they are correctly described as "having no ruler, overseer or guide;" for though one ant now and then is seen to assume the direction of a particular piece of work, as in the case of the removal of the spider, no one has ever been able to discover any indications of their having a general director even when upon their predatory excursions. They are also mentioned as "a people not strong, yet preparing their meat in summer." (Prov. xxx. 25.) I am not aware that it is spoken of in any other place of Holy Scripture.

Ants are possessed of a slimy acid of very peculiar chemical properties and possessing a

very sharp and penetrating odour. In Norway and Sweden, a strong vinegar is manufactured from them. The learned and venerable Baron Humboldt found them used as food among the miserable inhabitants of South America, where they were made up in balls with a kind of fat clay.

Mr. Preuss, the companion of Colonel Fremont in most of his journeys, being upon one occasion lost and absent from the camp without food for three days, allowed the ants to cover his hands, and then put them in his mouth and chewed them. He says he found them very refreshing! but I think most of us would be reduced to extremities before eating such food.

CHAPTER III.

THE LITTLE CONFECTIONER.

Jenny. How beautiful every thing looks this morning after the rain. I mean to gather a bouquet for mother and put it by her plate at breakfast. I shall have plenty of time, for the clock has only just struck six. I am glad I got up so early, though it was hard work; I was so very, very sleepy. But I must get my flowers together. I will begin with that tall blue larkspur, it looks so pretty in the middle. Oh, there is a bee in it! That is too bad! I wish you would go away, Mr. Bee.

Bee. Don't be afraid of me, Miss Jenny. I shall not hurt you unless you meddle with me. I am not nearly so quarrelsome as I am generally reported to be. Besides, I have finished this flower, and am going into that bunch of red clover, where I shall find plenty of honey.

Perhaps when you have gathered your bouquet it might amuse you to watch my operations.

Jenny. I should like it very much, if I shall not disturb you. I have often wondered how you could contrive to suck honey enough out of the flowers to fill your large hive, when you get so little at a time.

Bee. Patience and perseverance, my dear! But allow me in the beginning to correct a mistake,—a very common one, too, by-the-by: we do not *suck* the honey, and, indeed, cannot do so, as we have no proper proboscis. That which we use is a true tongue, with which we *lick* the honey out of the honey-cup (or nectary, as it is called) of the flower, and put it into our mouths. Sometimes it is so deep that we cannot get at it, and then we are obliged to leave it to our country cousins, the humble-bees, who have a way of piercing a hole in the side of the cup and extracting its contents in that way.

Jenny. And why do you not do so too?

Bee. Oh, it is quite too much trouble, and we get enough without it. It does very well for them,—poor things!

Jenny. And what next? How do you carry it home?

Bee. Why, I am rather afraid you will be shocked if I tell you; but, the fact is, we carry it home in our stomachs. You know we have no pails or bottles as you have, and so we are obliged to use such instruments as we possess.

Jenny. Oh, I am not shocked. Aunt Ellen told me that all animals have organs best suited to their purposes. I should like to hear more about it, if you please.

Bee. Very well. I shall be glad to tell you; for there is nothing which gratifies me so much as rational and instructive conversation with persons like you. We dislike pert and silly children, as every body else does. This honey, then, which we take from the flowers in a very different state from that in which you see it in the comb, being conveyed to my mouth by this long tongue, is received into the first stomach, or honey-bag, as it is called. There it undergoes a change—which I cannot very well explain to you—by which part of it is converted into beautiful straw-coloured honey, such as you see in the comb.

Jenny. And what becomes of the rest?

Bee. It is made into wax.

Jenny. Indeed! I did not think two such different things as honey and wax could be made from the same materials, and such simple-looking stuff too! How do you do it?

Bee. That also I cannot tell you, because I do not understand it myself, and I believe it has never been explained. If you look closely you will see on each side of me two little whitish pockets. In these the wax is formed—*secreted* is the proper word—in thin scales, which we take off as we want to use them. Now I have collected all the honey I can very well carry, and I am going into that hollyhock to get some pollen.

Jenny. What is pollen?

Bee. It is that coloured dust which you see upon the anthers of flowers. Some flowers have much more than others, such as the white lily, in which the dust is bright yellow or orange-coloured.

Jenny. Yes, I have often thought what a pity it is to have it get all over the inside and spoil the pure white.

Bee. But do you not know that this very dust is what makes the flowers for next year? If you were to take it all away the plant would have no seeds, and would soon die out. This pollen is very useful to us for food, and we often lay up great stores of it.

Jenny. How you roll about in it! You are quite covered, so that you look like a white bee. But I should think you would lose much of it before you get home.

Bee. So I should if I were to attempt to carry it in that clumsy way. But do you see these nice little brushes upon my feet? With these I gather it together into little balls and put it into these tiny baskets of hairs upon my hind-legs, where it is quite safe.

Jenny. There is a nice parcel of pollen in that lily: why do you not get that?

Bee. Because it is a rule with us never to gather two kinds at once. If we should, we might easily carry the pollen of one plant to another, and so spoil the seeds of both. Having begun with hollyhocks, I must finish with them before going to any other flower.

Jenny. That is very much like a rule my

mother gives me,—to do but one thing at a time. But that hollyhock does not seem to have any pollen.

Bee. I shall soon find as much as I want. The pollen is contained in these little lumps on the tops of the anthers, which only open when the flower is perfectly expanded; but I know how to open them, as you see, by giving them a good pinch with my jaws. You perceive that this one has more even than the other, now that I have got at it. See! there is a relation of mine busy in that London Pride: you observe his balls are of quite a different colour from mine.

Jenny. He makes a great deal more fuss about gathering it than you do.

Bee, (condescendingly.) Yes, he is a young bee, who has never been out by himself before, and he naturally feels very grand and consequential. He will learn more as he grows older, though I doubt whether he ever rises higher than the rank of wax-worker. But I have now got my load together and am going back to the hive. If you choose you can stand behind that tall rose-bush and see me

go in: I would not advise you to come any nearer, because, I am sorry to say, some of our family are not so amiable as I am,—I always was a very amiable bee, from the comb,—and you might get stung. (*Bee goes in, stopping a moment at the entrance to eat one of his pollen-balls, and distributing the rest among his relatives.*)

Jenny, (to herself.) You will never suffer for want of having a good opinion of yourself: that is certain. What a crowd of them there is! and what a noise they make! yet, when one watches them, there does not seem to be any confusion, either. The going and returning bees do not interfere with each other, and there is no quarrelling. What a hum they make! I heard Thompson say last night that he thought they would swarm to-day; but he must have changed his mind, for he is not watching them, but weeding the raspberries instead.

Bee. What were you saying, Miss Jenny, about swarming?

Jenny. I was saying that Thompson said last night that he thought you would swarm to-day.

Bee. I rather thought so too; but our queen has apparently given up the idea for this time, as she is walking about very quietly on the combs. I have just had the honour of giving her some honey.

Jenny. So you have a queen, like the ants?

Bee. Like the ants, indeed! Do you mean to compare us—us who are highly-developed hymenopterous insects, elaborating our own materials and building symmetrical habitations upon true geometrical principles—to those miserable subterranean little wretches who—

Jenny. Mercy on me! I meant no disrespect, Mr. Bee, to you or your queen. You need not buzz so angrily, nor use such very long words. You know I am only a little girl, and not very learned. I should be very much obliged to you if you will give me some information about your affairs, and especially about your queen, who I have no doubt is a very estimable body. I am very sorry if I have hurt your feelings in any way. I am sure I did not intend to do so.

Mr. Bee, (settling down.) Never mind, my child. I dare say you did not mean any harm,

but we are deeply devoted to our queen, and of course very jealous for her honour. What shall I tell you first?

Jenny. About your swarming, if you please.

Bee. In order to do that, I must give you some account of our internal economy. You must excuse me for using a hard word now and then, for I am—though I say it myself—something of a scholar.

Jenny, (to herself.) So is our minister, Mr. N., something of a scholar; but he never uses hard words when he talks to us children.

Bee. To begin, then: you must know that there are three sorts of us in every hive. First the workers, like myself, who do all the labour of the hives, collect the honey and pollen, make the wax, construct the combs and take all the care of the young ones. Then the drones or males,—a good-for-nothing, lazy, gluttonous, worthless set they are! I should get very angry whenever I think of them, only, as I said, I am very amiable. Then, last and best, the queens or females, who are the mothers of all the rest. The queen lays her eggs in the cells prepared for them by the

workers, sticking them in an upright position in one of the angles. She seldom puts more than one egg in a cell, and, if she does, the workers take them out again. These are hatched in about three days,—not, however, in the likeness of bees, but in the shape of little grubs, which are well attended to by the workers, and carefully fed with a kind of jelly prepared on purpose for them. You must know, however, that this food is different for the queen-grubs and the common ones, and, furthermore, that we can change working-grubs into queen-grubs, by feeding them with a different kind of jelly and confining them in differently-shaped cells.

Jenny. That seems very strange. What do you feed them with?

Bee. That is one of our state secrets, my dear. I must tell you, by-the-way, that our queens are not at all friendly to each other, and two never meet without fighting desperately till one or the other is killed. We never interfere in these battles, and, in fact, we encourage them, and even force them to fight. If, however, a strange queen attempts to enter

the hive, we do not usually sting her, but surround her and drive her out.

Jenny. What happens when two queens come out at a time?

Bee. If there is an old queen in the hive, this does not very often occur, because she kills them all before they come out of their cells.

Jenny. Not to offend you again, Mr. Bee, I must say that this queen of your's does not seem a very amiable person.

Bee. Well, no,—perhaps not what you call amiable; but, I assure you, she governs admirably.

Jenny. But you say she kills them before they come out: then, I suppose, they do not leave their cells till they are complete bees, all ready to fly?

Bee. No, of course not. After remaining in the grub or larva state a certain number of days,—usually about five,—the infant bee spins a little cocoon, in which she remains from four to eight days. Then she bites her way through and is ready to come out a perfect bee.

Jenny. But about the swarming?

Bee. Yes, I am coming to it directly. From the middle of May to the middle of June is our best swarming-time, though we do sometimes send forth colonies later. About the time for the first swarm to set out, you may see a great commotion in the community. There are probably several young queens who are just ready to come out, but who are kept close prisoners in their waxen dungeons and carefully fed with honey by the attendant nurses. These the old queen is very anxious to destroy, but the workers will not allow it. They surround her in a body; and though, as I said, we are very much devoted to her, they do not hesitate to pat and pull her, and even to bite her, to drive her away from the royal cells. This makes her very angry, and by-and-by she gets into a great fermentation, and hurries about the combs in every direction, till all things are in a state of perfect confusion and uproar. The nurses neglect the young ones; the foragers come in and throw down their burdens hap-hazard, or devour them themselves. Finally the queen makes a rush for

the door, followed by a large number of bees, old and young, and the swarm takes place. A few bees generally settle upon a branch or wall in a cluster; the queen joins them; others hang themselves to the first, and presently there is a large mass of bees suspended by their legs. Then some one comes with a clean hive, which they are sometimes kind enough to rub with rosemary and other sweet herbs, and shakes the swarm into it. The hive is then set down and the bees left to recover themselves the best way they can, which, if there is a queen among them, it does not take them long to do.

Jenny. I should not like to be the one to shake them down.

Bee. It seems like rather a dangerous service; but when the person is gentle and firm in his motions he does not often get stung. Sometimes the bees will settle all over him as thick as possible, and remove again without doing him any injury. If such a thing should ever happen to you, I advise you to stand perfectly still till some one comes to your assistance.

Jenny. I am sure I hope it will never happen. But what would you do if you should

lose your queen? for I suppose such a thing might be?

Bee. Yes; I was once in a hive where the queen disappeared one day, and we did not know what had become of her. I believe I was the first who discovered her absence, and of course I ran to inform my companions.

Jenny. How did you do it?

Bee. By crossing our antennæ. Well, by degrees the sad news spread through the hive, and such a scene of confusion I never saw before, and never wish to see again. The workers refused to go out; the nurses deserted the grubs, and even killed them; the whole population ran wildly about the combs, and every thing was dismay and distress. In three or four hours we began to grow calm, and to take the requisite measures for the preservation of the community, by preparing the royal cells and arranging the grubs in them. But these labours were suspended very unexpectedly next day by the entrance of a strange queen of most prepossessing manners and appearance. As soon as we discovered her, we surrounded her with every mark of

politeness and respect, and at once elected her to supply the place of our lost parent, whose post she now fills to admiration. I think perhaps she is not quite so firm in her government; but that is an amiable weakness. Had she made her appearance twelve hours before, we should hardly have welcomed her so warmly, as attachment to our former queen makes us for a time very unwilling to appoint a successor.

Jenny. And did you never know what became of the old queen?

Bee. Never.

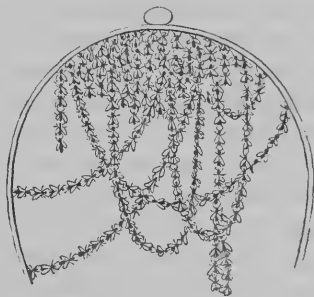
Jenny. Does a swarm ever set forth without a queen?

Bee. Sometimes; but they almost always return, unless a queen flies out and joins them, in which case they soon settle and make preparations for a comb.

Jenny. And what do they set about first?

Bee. The first thing is to provide wax and make a comb; and the manner of commencing this labour is very curious. The wax-working bees, having taken a plentiful meal of honey or sugar, (for either will do to make wax of,)

attach themselves to the top of the hive, and to each other, by means of their claws, till they form a sort of curtain, which is composed of long festoons of bees crossing and recrossing in every direction. In this way they hang



almost immovable for twenty-four hours, during which time the wax is formed in thin plates—or rather scales—around the wax-pockets. At the end of that time, if you were to watch them, you would see a single bee detach himself from the cluster and proceed to the top of the hive. His first move is to secure elbow-room for his operations by turning himself round and round; and, having done so, he suspends himself by his legs to this clear

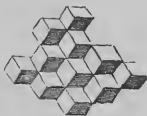
space. Then, taking a scale of wax in one of his claws, he works it over and over by means of his tongue and mandibles, kneading and preparing it, and mixing it with a white frothy liquor till it becomes white and opaque. The wax is now ready to begin the comb, and our little friend prepares to do so, by sticking that which he has prepared against the top of the hive, arranging it with his jaws and useful tongue in the wished-for direction. As soon as he has used up all his wax he leaves his task, and another succeeds him, and so on, till enough has been deposited to form the bottom of two or three cells. Sometimes a young bee will make a mistake, and put his lump of wax in the wrong place, in which case the one who comes after him rectifies the blunder. If you were now to examine the new structure, you would find it consisting of a simple partition of wax hanging down perpendicularly from the top of the hive, so that the cells which will presently be formed, and of which this partition makes the foundation, will be parallel with the bottom of the hive.

Jenny. Then the mouth of the cell will be towards the side of the hive.

Bee. Yes, certainly.

Jenny. But I should think all the honey would run out.

Bee. I will tell you about that when we come to it: at present we will attend to the formation of the cells. A nurse-bee now takes her turn to labour at the building, and, standing opposite the comb and rapidly moving her head from side to side, she moulds, by the aid of her jaws and tongue, a hollow in the mass corresponding to the shape of the bottom of a cell which is not round, but shaped as though you were to put three diamonds together, making a six-sided figure, or hexagon, as it is properly called.



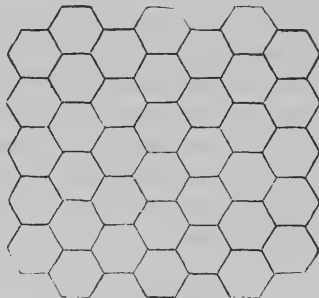
Jenny. Why do you not make it round?

Bee. Suppose you bestow a little consideration upon it, child, and see if you cannot find

out why a six-sided figure is the very best possible. I see you have a pencil: take that new shingle which Jemmy has left lying on the ground there, and draw two or three round cells side by side, and then as many hexagons, thus:—



and thus:—



There! do you not see how much space is lost between the circles, while the hexagons fit into each other exactly? And, if you will consider a little, you will see that the bottoms of two opposite rows of cells fit in the same way.

Jenny. I see. How very ingenious it is!

But why would not square cells answer? You would not lose any room then.

Bee. A little more consideration would show you that a square cell would be very inconvenient for a round animal to live in; and, besides, it would take more wax. It has been discovered by somebody, by calculation, that the form we use is exactly that which combines the greatest strength with the least expenditure of materials. But to return to our builder.

She has now, by means of her useful jaws and tongue, brought the cavity to exactly the right shape. She is then succeeded by another nurse-bee, who continues the work, deepening and polishing the cell, heaping up the excavated wax round its edge and pressing it solid with her feet. When it has arrived at a certain point, two bees begin the foundation of two other cells on the other side. All this time the wax-makers are adding to the mass. The walls of the cells are kept of equal size, and each layer of wax is carefully smoothed and polished before another is added. As soon as three or four rows are finished, the foundations are laid for two more combs outside the first,

and then for two more; and so on. Thus the middle comb always keeps the longest, and the bees are able to work without confusion. The spaces between them form streets of communication, and there are here and there passages through the combs themselves, which do away with the necessity of always going round. I must not forget to tell you that we use, to strengthen these cells, a kind of very sticky cement, which we extract from the buds of certain trees, such as the poplar and the balm of Gilcad. The bees now go to work and fill the cells with honey. A thick sort of cream rises to the top, which adheres to the sides and prevents the honey from running out.

Jenny. Mr. Bee, I should like to know one thing. Who taught you to build your curious and wonderful houses? A man would have to study a long time and try a great many experiments before he could do such a thing.

Bee. There is the great difference between men and animals. Men have to learn, as you say, by slow degrees and by many failures, before they can bring any thing to perfection; while we insects can go to work at once, as

soon as we are grown up, and provide ourselves with comfortable houses and all other things necessary.

Jenny. Yes; but then men are always improving, and you make your houses the same way year after year.

Bee. Well, and what better can we do? I should like to see your wisest men make any thing better for the use of a bee than a honeycomb. We have no need to improve, for our works are perfect from the beginning.

Jenny. That is very true. But who taught you? That is what I want to know.

Bee. Who gives to men all the wisdom which they have?

Jenny. Why, the Bible says, "Every good and every perfect gift is from above and cometh down from the Father of light;" and "He giveth wisdom liberally, and upbraideth not."

Bee. Well, this same great Being, who made us and you, put into the bees the knowledge which enables them to build their cells with mathematicall exactness, and temper the materials whereof they are composed so as precisely to answer their purpose; and the same Hand

guides us in the selection of our food and provides it in readiness for us. Thus He cares for all the little insects as well as for large animals and man, and provides for all their wants.

Jenny. Yes, I know: "He giveth to the beast his food, and to the young ravens which cry." That is in the Bible, too. But to go back to what we were saying:—I have seen part of the cells filled with something brown and solid, not at all like honey, which mother calls bee-bread. What is that made of?

Bee. That is the pollen which you saw me collecting. When we have more of it than we want to eat at once, we store it up in some of the empty cells. It is very necessary that we should have a good supply of this bee-bread on hand to eat with our honey in winter,—or rather, I should say, in the spring and fall; for in cold weather we do not take much food.

Jenny. Is the honey alike in all flowers?

Bee. Oh, no! There are some plants which we never touch at all, as the honey is unpleasant to the taste, and even poisonous. For instance, you never see a honey-bee in the

Crown Imperial, though the honey is very abundant. But it has sometimes happened, in spite of their powers of discrimination, that bees have collected poisonous honey, which has proved fatal not only to themselves but to their masters. Other plants we leave alone because the nectary is situated so deep that we cannot get at it.

Mrs. Humble-Bee. Yes; those you leave for me: and plenty of nice sweet food I get from them. There is no honey that compares, in my mind, with that of the scarlet honeysuckle.

Bee. I believe that is only a fancy of your's. You think it must be better because you are at such pains to procure it. It does very well for you, to-be-sure; but no hive-bee would take the trouble to pierce a hole in the bottom of the flower.

Miss Jenny, this is my cousin Humble-Bee, or Bumble-Bee as you call her,—(*introducing a personage not unlike herself that just then alighted near by,*)—a very worthy and excellent person, I assure you. I dare say she will be happy to give you any information in her power

with regard to her domestic concerns. And how do you get on, cousin? Have you had any more trouble with the wasps since I saw you?

Humble-Bee. Not very lately; and I fancy they have left the neighbourhood, or that something has happened to them, for as I was passing near the tool-house yesterday I saw their nest apparently entirely deserted.

Jenny. Thompson killed them all with sulphur-smoke, I know. They troubled him a good deal; and father did not like to have them in the garden, for fear they should sting the children. I felt sorry for them, for, after all, they did not mean any harm.

Humble-Bee. I think if they had robbed you as many times as they have me, Miss Jenny, you would be glad to have the neighbourhood cleared of them. I hardly dared to have any of the children go out while they were about.

Hive-Bee. The wasps don't trouble us much. They know better.

Humble-Bee. But you have other enemies, cousin, that are as bad.

Hive-Bee. Yes; the martens and swallows persecute us without mercy. I had quite a

narrow escape from a swallow early this morning; and last evening, as two or three of us were enjoying ourselves in a bed of blossoming thyme before retiring, a great ugly toad snapped up two of my companions. For my part, I do not see what frogs and birds, and such creatures, are made for.

Humble-Bee. I suppose they think they were made to eat bees. But little Gold-boots told me not long ago that a snail had crawled into your hive, and he thought it would make you a great deal of trouble. How did you manage with him?

Hive-Bee. Oh, we covered him all over with wax and propolis and glued him fast to the side of the hive. He won't go visiting bees again in a hurry, I guess. Snails are clumsy, dirty creatures; but, after all, they are not so bad as the great death's-head moth. They are the very pests of bees. That frightful sound which they make, paralyzes all our energies and gives them a chance to rifle our combs at their leisure.

Humble-Bee. But they are such large, clumsy creatures, I should think that, with all your

skill in building, you might contrive some sort of a breastwork or grating to keep them out.

Hive-Bee. You seem to think you have started quite an original idea, Mrs. Humble-Bee. If you will look at the entrance to our hive, you will see that we have constructed a series of defences, which, we flatter ourselves, will answer the purpose admirably. I do not think we shall have any more trouble with them. If they would only make their appearance in the daytime we should not fear them.

Jenny. What are those bees doing which stand before the entrance in rows with their heads towards the door? They move their wings up and down as if they were fanning something.

Hive-Bee. That is just what they are doing. They are our ventilators; and if you were to look inside the hive you would find a number more engaged in the same occupation. They stand in rows, and, uniting each pair of wings together by means of the little hooks with which their margins are furnished, they fan away industriously, till a current of air is created,

which soon refreshes and cools the atmosphere of the hive; for you must know that a bee-hive is a very hot place. Sometimes, when we are disturbed and very much agitated, the heat is increased to such a degree that the combs soften and fall down. This ventilation is one of the regular duties of the wax-workers, and they relieve one another at it. But it will not do for me to be talking here till noon: I must go and get some more honey. Perhaps, cousin, Miss Jenny will be interested in hearing of your nest, though it is nothing to *our's*. (*Exit Hive-Bee.*)

Jenny. Your cousin is wonderfully condescending to you, Mrs. Humble-Bee.

Humble-Bee. Yes; he thinks himself greatly superior to us, and some of my family are very much annoyed at it; but I do not see any use in caring for such things. His self-conceit hurts no one, unless it is himself. Much as he looks down upon us, however, we have a great deal of enjoyment, and use up our honey ourselves; whereas, no sooner does he get a box full than some one takes it away from him, and it is only lately that people have left off

smoking them with sulphur in order to take their treasures. Moreover, we all work together good-naturedly and happily, and have no drones to dispose of in the fall. And it does seem very cruel to me to kill the poor creatures, as the hive-bees do, though I suppose they cannot help it.

Jenny. Do they kill the drones?

Humble-Bee. It cannot be denied,—though they are not very fond of talking about it. In July and August the workers chase all the drones to the bottom of the hive, and there sting them to death, without mercy, throwing their lifeless bodies outside. I suppose it is better than leaving them to starve to death; but it does seem very hard-hearted.

Jenny. Then I suppose it is true that the drones do not make honey?

Humble-Bee. I believe they make neither honey nor wax, and do in fact live upon the labour of the other bees,—which must be very annoying, of course. Now, our males are just as industrious as any members of the community, and are very good-natured besides. I think, indeed, that humble-bees are not in

general so irritable as hive-bees: at least, they are not so ready to use their stings.

Jenny. That reminds me that I forgot to ask your cousin about his sting: but I presume you can tell me just as well.

Humble-Bee. Perhaps so, for all our weapons are constructed upon the same principle. A sting consists of several parts. First, a sharp-pointed sheath with a bag of poison at the root. In this sheath are contained three or four sharp, barbed darts; that is, their points are turned back like that of a fish-hook. When a bee is provoked, he first thrusts this sharp sheath into the flesh of his enemy: this is followed by the darts, which are drawn out and again returned two or three times; and finally a drop of poison is injected. Sometimes the bee cannot withdraw his sting, and flies away without it,—in which case the wound is much worse and the bee soon dies.

Jenny. And is the sting of a wasp the same?

Humble-Bee. The same, only more powerful and poisonous.

Jenny. I should like to hear about your nest, Mrs. Humble-Bee.

Humble-Bee. You must not expect any thing so grand as the combs of my cousins from me, my dear. I am a very plain, old-fashioned country bee, and build just as my people have always done since the beginning of time,—which is not the case with our cousins. I know the family used to live in hollow trees and caverns before men took to building houses for them, and they do so still in some countries. And I do not believe men would take the trouble to prepare such grand hives for them if they did not expect to get their honey in return. However, I have no quarrel with the hive-bees. We let them alone, and they let us alone, except when a pareel of them get hold of a weak-minded brother of our community and coax all his honey away from him. But we are on very good terms, as I said; and, upon the whole, they are excellent neighbours.

Jenny. Where do you build your houses?

Humble-Bee. In different situations :—sometimes in the tangled corners of a rail fence;

sometimes in a meadow; sometimes—though rarely—in a grove. There has been a nest under the back-steps for several years; but, for my own part, I prefer being farther from the house. We excavate, with great care, a hole about six inches deep, unless we can find a deserted mouse-hole suited especially to our purpose. This we cover over with a dome of thick moss, carefully carded and well fitted together, and lined with a coating of wax to keep out the wet. The entrance to this house is through a covered gallery, generally about a foot long and half an inch in diameter, connected with the lower part of the nest. If you were to open this nest, you would find several combs, placed one above another and supported by small columns of wax. These combs are not formed of honey-cells, but of the cocoons spun by the young before they change into perfect bees. On the top of the combs are a few large, roundish cells made of wax. These are constructed by the females, and contain the eggs and larvæ, together with a sufficient supply of food.

Jenny. What do you give the young ones to eat?

Humble-Bee. Pollen mixed with honey for the workers, and pure honey for the males and females. Besides that gathered for the use of the young, we always have a pretty good supply on hand against a rainy day, which we store up in round, open vessels, made by cutting off the ends of the empty cocoons and strengthening them by a rim and inside coating of wax. Sometimes, when wax is plentiful, we construct our honey-pots entirely of it. But we seldom store up much in advance, as we do not need it for winter.

Jenny. What becomes of you in the cold weather, then?

Humble-Bee. Most humble-bees die in the fall, and only a few females, and now and then a worker, live through till spring. I dozed away the whole of last season in an apartment in the garden-bank nicely lined with moss, and only came out when the trees were in blossom.

Jenny. What did you do for a nest?

Humble-Bee. I went to work and made one,

of course. I am not so helpless as to need a hundred or two workers to wait on me, I hope. Then I laid about half a dozen eggs, which were soon hatched out, and a busy time I had feeding the young ones, for, the season being backward and flowers scarce, I could not collect together enough at once to last them through their transformation. Luckily, we had beautiful weather. In ten days they were all out and ready to work, and I gave them their first lesson in moss-earding.

Jenny. I would like well to know what the lessons were.

Humble-Bee. There is a fine bank of moss not six inches from my door. At this I stationed myself, placing my young ones in a line behind me, so that the last was at the entrance of the nest. I then pulled out a little moss, carded it carefully with my fore-feet, rolled it into a ball, and then pushed it under my body till the one behind me could reach it with his claws. He in turn passed it to the next, and so on, till it reached the nest. When I had showed them sufficiently, I went away to gather honey, and left them to themselves,

and before my return they had carded a fine supply. This is the way we always manage; and you will easily see how much time is saved by it, and what a useful employment it affords for young workers.

Jenny. Yes; I think it an excellent plan. I have always liked humble-bees, they are so good-natured and so large and handsome. I love to see one tumbling about in a squash-blossom as though he were taking a golden bath. But do you always go home at night to sleep? I think I have seen several humble-bees hanging upon the lilac-bushes after dark, especially in damp evenings.

Humble-Bee. Yes; it is very likely you have. We cannot fly in the rain very well, and if we are overtaken by a shower we generally stay where we are until it is over and the sun shines again. Sometimes, too, I am sorry to say, humble-bees drink more than is good for them, and become so top-heavy that they cannot get home. In this condition the hive-bees sometimes get round them, and, partly by force and partly by coaxing, rob them of all their honey. Sometimes, too, they tumble upon the

ground and become the prey of ants or hornets, who carry them off bodily.

Jenny. How many do you usually have in a nest?

Humble-Bee. Our families are very small, compared to those of the hive-bees. We never have more than two hundred at the outside, and often only sixty or seventy; but we are all so industrious and so fond of each other that we accomplish a great deal of work. I often pity the solitary bees when I see them going about their work all alone. It must be so dull for them, poor things!

Jenny. Then all bees do not live in families?

Humble-Bee. No,—not all. There are some who on that account are called solitary bees. They make nests each for their own young, and really show a great deal of perseverance and skill about it. The principal are the leaf-cutting, the wood-boring and the mason-bees.

Jenny. Can you tell me about them?

Humble-Bee. Yes, if you would like to hear. The wood-boring bee bears some resemblance to myself, though she is rather deeper-coloured. I say *she*, you observe, for really the female

does all the work. She selects a post or plank suitable to her purpose, and is rather particular in her choice; for if the wood is green she cannot bore it, and if it is in the shade it will be too cold and damp for her young. Having selected her location, she begins, by means of her strong jaws, to bore into the wood in a slanting direction till she has reached a certain depth, when she turns and goes straight downwards. For many days, and even weeks, she may be seen going in and out and clearing out the saw-dust, which she does not throw away, but deposits in a neat heap near at hand for future use. When the hole has reached the depth of twelve or fifteen inches, she divides it into about twelve compartments, the first of which she fills full of bee bread, for the use of the future young one, and lays one egg in it. Then, having covered it in with a roof of saw-dust ingeniously glued together in rings, she pursues the same course with all the others till the tube is full, when she closes it up, and goes to work to make another. A single bee will construct three or four of these in a season.

Jenny. But what will they do when they

want to get out? Of course, the first laid will be first hatched; and I do not see how he is to make his way into the world without destroying all the cells.

Humble-Bee. My cousin knows how to provide for that. She makes an opening from the outside of the post into the lower cell; and, the grub being hatched with his head downwards, as soon as he is ready, walks out of the back door, and leaves it open for the convenience of the rest of the family.

Jenny. That is very cunning, I must say. And now for the leaf-roller.

Humble-Bee. You must sometimes have seen leaves and flowers, which have had round pieces cut out of them, as if with scissors.

Jenny. Yes; and I have often wondered who did it!

Humble-Bee. The scissors are the jaws of the upholsterer-bee. She digs a hole in the ground, and lines it with a triple curtain of leaves, which she cuts with the most perfect exactness in the shape she wants. The cells are formed like a thimble, the end of one fitting the mouth of another. When the

first cell has received its contents of honey and an egg, she cuts out a piece of leaf exactly the size of the mouth and fits it in. It seems strange that she can carry the size in her head so exactly, but she never makes a mistake.

Jenny. It is curious, truly! I should have to try a great many times before I could cut out a piece of paper exactly to fit the size of my thimble without measuring. I think it is as ingenious as any thing done by the hive-bees. But do they always use green leaves? I think I have seen the leaves of petunias and morning-glories cut in the same way.

Humble-Bee. I dare say, for she takes whatever suits her purpose best. One kind uses only the petals of the scarlet-poppy.

Jenny. But what does the mason-bee build? A stone house, I suppose from his name.

Humble-Bee. You may laugh at the idea if you please, Miss Jenny, but the mason-bee does actually build a substantial stone house for its young out of grains of sand and earth, which it plasters upon stone or brick walls. It generally places two or three cells together, and then covers them with a roof, which, in

time, becomes as hard as a stone. Hard as it is, however, the young bees find no difficulty in gnawing through it when their time comes to get out. And now, my dear, I must bid you good-morning. I cannot ask you to come and visit me; but, whenever I am buzzing about the garden, I shall be happy to see you.

Bees, even more than ants, have been made the subject of great attention and study from very ancient times; and some philosophers are said to have retired from the world and spent fifty or sixty years in observing their habits,—a space of time which they employed to very little purpose, judging from the absurd mistakes they made. It was gravely stated by one of these ancient authors, that bees were produced from the decayed bodies of oxen and lions,—the kings and leaders from the brain, and the common ones from the flesh; also, that they gathered their young from the leaves and flowers of certain plants, more particularly the olive-tree. It was also believed that they would allow no thief, adulterer, or profane person to approach them.

In latter days, very accurate and long continued observations have been made upon the manners and customs of these busy people; and, strange to say, the person who has been most successful in understanding and explaining the phenomena of their building, breeding, &c. was M. Huber, a blind man. This gentleman was born in the city of Geneva, in the year 1650. He was destined for a learned profession; but had the misfortune to lose his sight entirely, from exposure to a severe snow-storm,—a calamity which might have been supposed to put an effectual bar in the way of observation upon nature. Nevertheless, by the aid of his wife, who married him after he became blind, and of a young man named Burnens, who was his secretary and personal attendant, and who seems to have served him instead of eyes, he managed to indulge his favourite tastes, and to collect much valuable information. By the help of these faithful friends, and by means of glass hives set upon tables of the same material, M. Huber discovered a great deal of what is now known respecting these insects. It is said that the bees

would never sting him, let him do what he would to them; and it is well known that some persons have much more power over them than others. It is quite true, that bees possess the secret of changing worker-grubs into royal-bees, by feeding them with a particular kind of food, and enclosing them in large cells, which are placed perpendicularly instead of horizontally, like the common ones. No one has yet discovered the peculiar properties of this royal-jelly, except that it is more pungent or sharp in its taste than the common food of the young bees.

A swarm of workers, which have been deprived of their queen, may be tranquilized by giving them a comb containing worker-grubs. They immediately set themselves to work to convert some of the worker-cells into royal ones; and, as if satisfied with having in their power the means of repairing the loss, they set quietly about their usual occupations. It seems to be entirely by means of their feelers or antennæ that they discover the loss of their queen. Huber proved this by a curious experiment. He first divided the hive into two portions by a partition, which

allowed scents to pass through, but would not permit the insects to touch each other,—the queen being upon one side and the workers upon the other,—when the same confusion followed as though the queen had been removed. He then substituted for the partition a grating which kept them apart, although it allowed their antennæ to pass through. In this case, the bees continued quietly at work as usual, though a great number of them were continually mounted upon the grating, crossing their antennæ with those of the queen, who remained as closely attached to the other side.

The devotion of the neuters to their queen seems to have something more in it than mere selfish considerations for their own welfare. M. Reameur, a French entomologist of great scientific knowledge, took out of some water a queen bee, who was so far gone as to be quite motionless, and had, moreover, lost part of a leg. This unfortunate monarch he put in a box with a number of workers who had recently been in the same condition, and some of them were still apparently lifeless. As soon as the recovered workers perceived their queen,

they surrounded her closely as if to warm her, and did not cease to lick her body till she showed signs of returning life, when they set up a joyful hum, though they had before been quite silent. It is singular that, with this attachment to the person of their sovereign, they should always insist upon her fighting every stranger queen who enters the hive. Should she fall, which is not common, they immediately elect her rival in her place.

Terrible combats sometimes take place between bees of different hives, but at other times they interchange friendly visits. It would seem, in one of these cases at least, as if familiarity had its proverbial effect of breeding contempt; for, after ten days of pretty constant intercourse, a furious battle ensued, in which many were slain. Sometimes a duel takes place within the hive; in which case the victor always carries out the body of its victim and deposits it at a distance from the hive.

Bees, like ants, are fond of drinking; but, unlike ants, they are far from being dainty in their choice of water, and indeed seem to prefer that which is stagnant and even putrid.

They devour not only honey and pollen, but also the sweet juices of fruit, especially raspberries; and, when honey has failed, whole hives have been kept alive by feeding them upon molasses and water. Dr. Kirby seems to think that they are fond of salt; but I have never seen this fact mentioned anywhere else. They remember where they have once found food, and often return to the same place for it, even after the lapse of several months, as was proved by one of Huber's experiments. He placed upon a window some honey, to which the bees were attracted in crowds. The window was kept closed during the winter; but in the spring the bees returned to it, evidently expecting their usual supply.

The eyes of bees are very good; and it would seem to be by the sense of sight principally that a bee finds his way home to his hive, rising perpendicularly into the air first, and then directing his course straight as an arrow to his own door. The bee-hunter avails himself of this property to discover the position of hives in hollow trees. Providing himself with a little honey-box, for confining the bees, a tin plate,

and a light stand for supporting his apparatus, he goes out into a neighbourhood where he suspects such hives to exist, and placing his plate in the proper position he proceeds to burn a little honey. The smell at once attracts the bees, and the hunter is able to catch several, which he confines in his box, allowing one to fly after a short detention. Marking by a compass, or some other means, the course taken by the insect, he removes to some distance and allows another of his prisoners to escape. Then, following up the direction of this last bee, he seldom fails to find the hive at the intersection of the two lines. He usually marks the tree, and continues his investigations elsewhere, returning after a time to take possession of his treasure. One of these trees will often contain thirty or forty pounds of honey.

Bees have a good many enemies. Swallows and martins consider them a dainty morsel,—toads snap them up at unwary moments,—and the speckled trout himself does not disdain them. The liking of bears for honey has been celebrated ever since the time of Esop, and the great grizzly himself partakes of the same

taste. Mice make their way into the hives and nest among the combs, a singular and inexplicable circumstance,—considering how apparently easy it would be for the bees to drive them out with their stings. The great death's-head moth (*Sphinx Atropes*,)—so called from having a figure like a skull upon its back,—robs them of their honey; and certain other moths pass the whole of their larvæ state among the combs. It would appear, from one of Huber's experiments, that the sphynx can succeed in his marauding expeditions only at night, as in the daytime the bees destroy it without hesitation. Bees are also subject to the attacks of several sorts of parasitic insects, which greatly annoy and sometimes destroy them.*

The humble-bee is less irritable in his temper than the hive-bee, and is usually supposed to possess much less intelligence, but there seems no good ground for this idea. They adapt themselves to circumstances, and provide against accidents with even more ingenuity. The younger Mr. Huber once put a dozen

* Parasitic insects are such as live upon the bodies of other animals, as the flea, &c.

humble-bees in a glass case with a piece of comb containing ten silken cocoons, but so uneven that it tottered and would not stand firmly. This greatly annoyed the poor bees, as it prevented them from clustering upon the young after their usual fashion. After a time, however, several of them mounted upon the comb, and, fixing their hind legs to its upper edge, and their fore legs to the table, they succeeded in steadying the mass. They continued this attitude for three days, by which time they had prepared wax enough to build pillars, and thus support the comb. By some accident, these pillars were again displaced, and, once more, the affectionate little creatures assumed their constrained and painful position, till Mr. Huber, pitying their distress and touched by their constancy, did their work for them. On another occasion, having covered a nest with a glass-shade, he stuffed the spaces between its edge and the uneven surface upon which it stood with a linen cloth, whereupon the bees tore the cloth thread by thread, combed it, and used it to cover their nest instead of moss. On another occasion they used

the paper from the cover of a book in the same manner.

The humble-bee is usually seen near the ground; but, on one occasion, he seems to have flown high enough. When Col. Fremont ascended the highest peak of the Rocky Mountains, which, in all probability, no human foot had trodden before him, "on the summit, where the stillness was absolutely unbroken by any sound and the solitude was complete, we thought ourselves beyond the region of animal life; but while we were sitting on the rock, a solitary bee (*bromus*, or the humble-bee) came winging his flight from the eastern valley, and alighted on the knee of one of the men. It was a strange place,—the icy rock, and the highest peak of the Rocky Mountains,—for a lover of warm sunshine and flowers; and we pleased ourselves with the idea that he was the first of his species to cross the mountain barrier—a solitary pioneer to foretell the advance of civilization."

Bees and honey are often mentioned in Holy Scripture, though they seem to have been usually wild bees, making their nest in trees

and clefts of the rock. Samson found that a swarm had taken possession of the carcass of the lion which he had killed. In that climate the flesh would dry up very rapidly; and the skin, adhering to the bones, would make a commodious harbour for them. That honey was a common article of food appears from many passages both in the Old and New Testament. The taste of manna was compared to that of wafers made with honey; and "a land flowing with milk and honey" is a very common figure to express an abundance of all good things. The irritable and revengeful spirit of bees is made the subject of comparison in Psalm cxviii. 12.* "They came about me like bees, and are extinct even as the fire among the thorns." John the Baptist, during his abode in the wilderness, subsisted upon locusts and wild honey, and the latter is still found abundantly in the Holy Land.

Bees have, on two or three occasions, been used

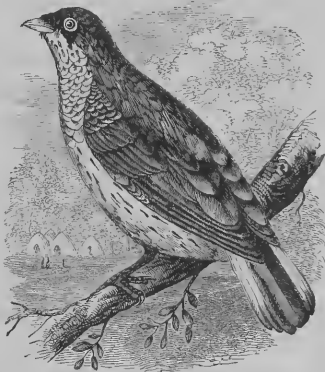
* See also Deuteronomy i. 44. And the Amorites, which dwelt in that mountain, came out against you, and chased you, as bees do!" A very striking comparison to those who were familiar with the warlike habits of these animals.

as defensive weapons, and with eminent success. "A small privateer, with forty or fifty men, having on board some hives of earthen-ware full of bees, was pursued by a Turkish galley manned by some five hundred seamen and soldiers. As soon as the latter came along side, the crew of the privateer mounted the rigging with their hives, and hurled them down upon the deck of the galley. The Turks, astonished at this novel mode of warfare, and unable to defend themselves from the stings of the enraged bees, became so terrified that they thought of nothing but how to escape their prey; while the crew of the small vessel, defended by masks and gloves, flew upon their enemies sword in hand, and captured the vessel almost without resistance."

When Amurath the Turkish Emperor, during the siege of Alba Græca, had battered down part of the wall, and was about to take the town by assault, he found the breach defended by bees, many hives of which the inhabitants had stationed on the ruins. The Janissaries, though the bravest soldiers in the Ottoman Empire, durst not encounter this

formidable line of defence, and refused to advance." Both these stories rest on tolerably good authority, and the first at least is likely enough to be true.

Foreign bees (at least those of Africa) have certain enemies which, unable themselves to effect the destruction of the industrious community, are content to call upon each other, and often upon man himself, for aid. The first of these, the honey-guide, (*Iceulus Indi-*



cator,) is a small brownish-gray bird, about the size of a robin. It is very fond both of honey

and bees, but, unable to gratify its taste by its own exertions, it directs the negroes by a peculiar cry or whistle to the tree containing them, "advancing before them by longer or shorter flights, according to the greater or less distance of the object of pursuit. If its followers lag behind, it returns with manifest impatience, and, by its redoubled cries, appears to chide their delay. As it approaches the tree, its flight becomes more limited, its whistle is repeated at shorter intervals, and, at last, having brought its associates to the required spot, it hovers over it for a moment as if to mark it out distinctly, and then quietly takes up a station at a little distance waiting the result, and expecting its share of the booty, which it never fails to obtain." On other occasions, it calls in the aid of the Honey-Ratels. This is an animal found near the Cape of Good Hope, of a dark brown colour on the under parts of the body, and whitish above, and protected by a very thick skin, as well as by its thick, rough coat, from the stings of the bees. The honey-guide points out to the Ratels the situation of the nest; the Ratel soon scratches it open with his



African Honey Rat.
Ratelus Capensis.

stout claws, and, appropriating to his own share the honey, leaves to his feathered assistant the combs filled with the young brood, which is the feast he prizes most. We might find it difficult to believe this story, if it did not rest on the best of authority; but there is no doubt about its truth.

There are a great many varieties of foreign bees, some of which build in the branches of trees; others in clefts of the rocks, as mentioned in Holy Scripture; others in the ground, like humble-bees. Stedman speaks of one which builds its nest in the roofs of houses, without at all molesting the regular inhabitants, though it attacks strangers with great fury. The honey of some of the South American species is said to be poisonous, producing convulsions and violent pains. Mayer Mitchell says that he found bees in abundance in some parts of the interior of Australia; and, on one occasion, examining his rifle, which he used frequently, he found it filled to the depth of two inches with wax and honey. He had several times seen a bee entering the muzzle of the gun. Had he been obliged to use it, the poor insect

who had selected this apparently secure retreat must have been rather unpleasantly surprised. In another place, he mentions a curious method practised by the natives of taking the spoils of the wild bees.

“We were now,” he says, “in a land flowing with milk and honey;” for the natives, with their new tomahawks, extracted it in abundance from the hollow branches of the trees, and it seemed that, in the season, they could find it almost anywhere. To such inexperienced clowns as they probably thought us, the honey and the bees were inaccessible and indeed invisible save only when the natives cut it out and brought it to us in little sheets of bark, thus displaying a degree of ingenuity and skill in supplying their wants, which we, with all our science, could not hope to attain. They would catch one of the bees, and attach to it, with some rosin or gum, the light down of the swan or owl. Thus laden, the bee would make for the branch of some lofty tree, and so betray its home of sweets to its keen-eyed pursuers, whose bee-chase presented indeed a laughable scene.”

CHAPTER IV.

A PAPER-MAKER.

Thompson. SEE here, Miss Jenny. Do you want this to put among your curiosities?

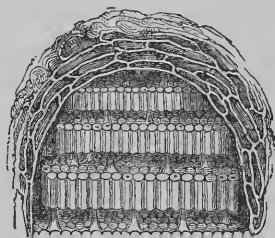
Jenny. Oh, yes; thank you, Thompson: how pretty it is! What is it?

Thompson. It is the wasps' nest, that used to be on the tool-house. But you need not be afraid; there is nothing in it now. I smoked it well with sulphur, and shook it carefully before I brought it in. I think they are curious things, considering who makes them.

Jenny, (alone.) I think they would be curious whoever made them. Poor wasps! Their nice castle did not help them much. How pretty it is, and how light! I wonder what it is made of? It looks like coarse paper, but I suppose that can hardly be.

Wasp, (from the inside of the nest.) It is paper. (*Jenny lays the nest down hastily on*

the outside of the window. A wasp crawls out upon the outside of the nest, and begins to stretch himself.) Don't be afraid of me,



A Wasps' Nest.

child, I won't hurt *you*, though if I ever come near that Thompson I will give him a lesson. I should like to know what business he had to come puffing tobacco-smoke and sulphur into our nest and smothering all my relations at once. But I heard you say you were sorry for us, and so I won't sting you. Indeed, I am not sure that I could sting if I tried, I am so choked and suffocated with that abominable smoke. So, (*after composing himself,*) now I can breathe again. Did I hear you wondering what our nest was made of?

Jenny. Yes; I was saying I thought it looked something like coarse paper or pasteboard.

Wasp. So it is paper; but, as to its being so very coarse, I presume it would not compare in delicacy with some of your writing-paper; but it answers an excellent purpose for our nest,—much better than if it were fine.

Jenny. But how do you make it? Our paper is made from pieces of cloth; but you have no rags, and no machines to cut them up and boil them.

Wasp. And I have no need of any such thing. My strong jaws, and a little damp and rotten wood, are all the machines and rags that I need.

Jenny. Will you please to tell me how you go to work to make a nest?

Wasp. Very willingly, for I do think a wasp's nest is something to be proud of. The founders of our families are the females who live over the winter; for you must know that the great majority of wasps die in the fall. As soon as one of these mothers awakes from her long sleep, her first care, after eating and drinking, is to select a place for a new nest.

You may call it a vespiary, if you choose, for that is the name some learned men have given us, and it certainly sounds much better than wasps' nest. Having pitched upon a situation, she begins by gnawing a few fibres.

Jenny. What are fibres?

Wasp. Fibres are like threads, child. If you observe wood closely, you will see that its substance consists of bundles of these threads placed close together. You can observe these fibres very plainly in wood that is partly decayed. They are necessary to all sorts of paper-making.

Jenny. Yes, I know now; I have often picked wood to pieces with my fingers. I was going to ask why you could not use sawdust; but I suppose the fibres are in too little pieces. Go on, if you please, sir.

Wasp. Well, then, this female who has survived the cold weather begins by gnawing a few fibres from a rail or post, or perhaps from the window-frame. When she has collected enough for a beginning, she kneads them over and over, moistening the substance from time to time with a kind of glue or size with which

she is provided, till it loses its woody consistency, and when it is spread out looks like wet brown paper, only tougher. With this she flies off to the place which she has selected for her habitation, and then begins a dome, which will in time form the outside of the nest. The little sheet of paper which she has formed is about as thick as thin letter-paper; and you may imagine how much work is required to make such a nest, when I tell you that the outside shell or case is composed of sixteen thicknesses of such sheets, each sheet not being more than a quarter of an inch broad at most.

Jenny. But does she wait till all this large nest is finished before she lays her eggs?

Wasp. Oh, no! That would never do. She builds enough to form a shelter from wet, and then constructs a comb of the same material as the outside and shaped like those of the bees,—only that they are in single rows, and placed horizontally instead of perpendicularly.

Jenny. Then you don't make wax?

Wasp. No, nor honey, either. I think I see three or four hundred wasps hung up by their legs, like meat in a butcher's shop, for twenty-

four hours together, just to make wax. What should we want it for, when we have all the materials for paper ready at our hand?

Jenny. I think wax is rather prettier.

Wasp. That is merely a matter of taste. Now, I would not live in a waxen house if any one should give it to me; and as for subsisting upon honey and that insipid pollen, the very thought of it makes me sick. Not but that a little honey does well enough now and then, for a variety.

Jenny. What do you eat, then?

Wasp. Meat, to-be-sure, as such warlike insects should. We catch flies and other insects, and appropriate any bit of flesh we find lying about. Besides, we are fond of the juices of fruits, and we do not object to sip from a glass of wine now and then. We are especially fond of liver. But, for my part, I like a fat blue-bottle fly best of any thing.

Jenny. And do you feed the young ones with the same food?

Wasp. Yes, just so soon as they are hatched. So you see the founder has a busy time of it for a while. The first brood are all neuters, or

workers, as they are called,—though, for that matter, we all work: no stupid, lazy drones among us, I can tell you. As soon as the young ones come to maturity, they all commence labouring in the common cause, lengthening the dome, constructing new combs and bringing food for the young ones that succeed them. Just so soon as a cell is empty it is cleaned and repaired and made ready for another egg. Of course, the female has to do this at first; but after the males are hatched they take all such work upon themselves, and are very neat and expeditious about it. As more and more are hatched, the nest grows in proportion, and by about the middle of July, or perhaps before, the house is large enough, and has assumed the shape which you see. You observe that it has two doors: one of them is for entrance and the other for exit; so we have no confusion. A good-sized nest will contain about sixteen thousand different apartments; and, as these are filled thrice in a season, you may form some idea of the number of our community.

Jenny. I don't wonder that there are so

many wasps about in fruit-time. How are the combs arranged?

Wasp. One above another, supported and separated by pillars and colonnades elegantly proportioned and carefully finished. There is always an empty space between the combs and the outside wall, and sometimes we make a circular passage directly through the combs from top to bottom. But you can never form any idea of the beauty of a wasp's nest from mere description.

Jenny. Are there not wasps who make houses under ground?

Wasp. Oh, yes,—the yellow-jackets. They sometimes take possession of a mouse-hole, sometimes dig a hole for themselves, (for they are excellent miners,) and now and then some enterprising colony will drive out a horde of humble-bees and take possession of their quarters. The general plan of their operations is the same as our's, only that they do not take nearly so much pains with their paper, and the outside of the nest looks like a parcel of little rough oyster-shells heaped together. They always excavate two long

winding covered ways, the one to enter and the other to leave the nest, and, upon the whole, display considerable ingenuity. They are high-spirited, warlike insects, too! Oh, yes; they are in every way worthy of being our cousins,—and that is high praise.

Jenny. You spoke of one female commencing the nest? Is she your queen?

Wasp. Queen! No, indeed. To think of seeing wasps submitting themselves to a queen, following her about, feeding her with honey, going wherever she goes, and unable to do any thing without her! That would be a pretty story, indeed. No! our government is purely democratic, and the females are pretty much upon a level with the rest of us; and, though we pay a good deal of respect to the founder as being the mother of most of us, yet she never thinks of taking the direction of matters. She never ceases to set an example of industry and devotion to the common cause, and is altogether a most praiseworthy creature. There may be probably six or seven hundred other ladies in our community, who all live upon good terms with the founder and

with each other, instead of fighting and stinging each other to death, like your favourite bees, who are held up as such patterns of goodness. They are very domestic, and are seldom seen abroad except in the fall, when they make their wedding-excursions. In fact, notwithstanding we are called so ill-tempered, the interior of one of our nests presents a scene of the greatest harmony and affection. I do not think I ever saw two wasps fighting in my life. Then we are so obliging to each other. A wasp comes in who has been gathering the juices of fruit. Then a few who have not been out come around him, and he divides his load among them; and some children I know might take a lesson from their good manners. There is no greediness, no hoarding of choice bits: it is share and share alike,—and no pushing or crowding.

Jenny. I am glad to hear that you are fond of each other, for certainly it must make your work much pleasanter. And now about the males?

Wasp. Oh, they have their appointed work, like all the rest of us. They clean out all the

cells, as I told you, sweep the streets and passages, carry out all rubbish and perform the duties of sexton and undertaker. They are very neat and expeditious about their work. When a dead body is too heavy for one, another comes and helps him; and, if no one is at hand to share his labours, he will cut the body in two and carry out part at a time. They are seldom seen abroad, though they fly out now and then in the fall. The third class, and the most important of all, and the one to which I belong, is that of the neuters or workers. We collect the provisions and divide them among those whose duties detain them at home, extend and improve the nest, mount guard at the doors and do all the fighting.

Jenny. Do you have regular sentinels, as they do at the fort?

Wasp. Always during the day. You may see the guards marching backwards and forwards at the entrance of the gate, examining all that comes in or goes out and keeping vigilant watch over the interests of the community. Should these guards be cut off with-

out being able to communicate with their friends inside, the nest might be destroyed without resistance. Should they be openly attacked, however, they do not stop long to resist, but hurry in, and soon bring out a legion of armed soldiers, before whom everybody will do well to retreat, for a wasp's sting is no trifle, I assure you.

Jenny. I know that very well. Father was stung upon the hand by a hornet last summer, and he could not use his fingers for a week.

Wasp. Yes; the sting of a hornet is very bad,—much worse than that of a wasp: they are very vindictive, too, and seem sometimes to sting without any provocation at all, while wasps usually let those alone who let them alone.

Jenny. Is the hornet a cousin of your's?

Wasp. Yes, our own cousin; but we are not on good terms, and avoid each other as much as we possibly can. All sorts of insects hate him, and with some reason; for, if his speed and strength were at all equal to his appetite and his disposition for mischief, he would not leave a fly or bee alive in the whole garden.

But he is rather a clumsy fellow, and has some bad habits, which often bring him into mischief. If he gets into a plum or peach, or if he finds any wine or brandy exposed, he will drink till he is too tipsy to move, and then he is easily disposed of. He often flies against a tree or wall and knocks himself down, and, if any one comes across him before he recovers himself, there is an end of the hornet. It is curious that those contemptible creatures, humble-bees and hive-bees, and even the stupid beetles and caterpillars, are comparatively safe: hardly any one thinks of killing them, while men, women and children make war upon wasps and hornets.

Jenny. Because wasps and hornets are always making war upon other people. If they would mind their own affairs and be peaceable, like the ants and bees, or even the stupid blue-bottles, nobody would want to molest them; but if you will fight all the world you must expect all the world to fight you. There you made your nest on the back of the tool-house, and might have lived there peaceably all summer; but, the very first time Thompson came after his garden-

line, two or three of you flew out and gave him a black eye, besides stinging poor Bugle till he howled and rolled like a crazy creature and would not go into the garden again for a week. What could you expect after that? You even stung my kitten,—my dear little harmless pussy; and she can hardly walk yet.

Wasp. Well, well, I don't want to be preached at now; I am in trouble.

Jenny. And I don't want to preach at you, I am sure. I would much rather hear more about your history and that of your relations. What sort of nests do the hornets make?

Wasp. Pretty much like our's, except that they hide it in a hollow tree or some other snug place, and use a coarser and stronger kind of paper. They are as fond of meat as we are, attack all sorts of insects without mercy, and often kill and carry off creatures larger than themselves. The other day I saw one very much embarrassed by a large kind of fly which he had killed and was trying to carry home. Every time he tried to rise into the air, the wind would catch the fly's wings, which were large and stretched out stiff, and turn

him round in a direction quite contrary to that which he wished to pursue. At last, after several trials, he gave it up, and went to work another way. He alighted upon the walk and expeditiously sawed off the wings of the fly, after which he rose into the air with the body and pursued his way without difficulty. A kind of West Indian solitary wasp is said to pursue the same course with eockroaehes, of which he kills a great many and stores them up as food for his young.

Jenny. Then you have other relations besides the hornet?

Wasp. Yes, plenty, both in this eountry and abroad. There are a good many who, like the one last mentioned, live solitary lives, each constructing her own eell and providing for her own young in her own way. One of them is called the sand-wasp. By means of her strong jaws she digs a hole in hard sand, and sometimes even in the surface of stone walls, softening the stubborn material by washing it with a peculiar liquid with which she is provided. With the sand which she takes out she builds a tube of the same diameter as the hole,

about an inch long and curved into the shape of a quarter-circle. When she has finished her hole, the inside of which she smooths with great care, in order that it may be comfortable for her little grubblings, she lays an egg at the bottom and then goes to work to provide a supply of food for the future wasp. She collects ten or twelve little green caterpillars, all about of a size, and, paralyzing them in some way so that they cannot move, (but how she does it I don't know,) she packs them alive into the hole above her egg, rolling them round neatly and pressing them down with her feet.

Jenny. Why does she not kill them?

Wasp. Because, you foolish child, they would all spoil if she did, whereas now they constitute a supply of fresh provisions, enough to last her young one through its infancy. As soon as she has got enough together she takes down the tunnel which she has built, and with the materials stops up the mouth of the hole, so that it looks just like the rest of the wall or bank. She will make perhaps half a dozen of these holes in a season.

Jenny. But what is the use of her taking

all that pains to build the tube, when she takes it down again directly?

Wasp. That I cannot tell you, unless it is to keep out the ichneumon flies.

Jenny. What are they? I never heard of them.

Wasp. They are flies which never make nests of their own, but go about laying their eggs, sometimes in the eggs or nests, sometimes in the very bodies, of other insects, such as caterpillars, solitary bees, &c. There is a particular kind which is always on the lookout for nests of the sand-wasp and spider-wasp. Then, when the young ichneumon is hatched out, it not only devours all the provisions so carefully laid up for the young wasp, but actually devours the poor little grub himself. All insects detest them worse even than the hornets themselves.

Jenny. But what good does the tube do? Cannot they get into it?

Wasp. They can, but they are usually afraid to do so. The shape of the tube prevents them from seeing if the mother-wasp is at home, and if she happens to be within she

gives them a reception more warm than welcome. I saw one try it one day. She hovered round and round, and seemed very undecided; but at last she ventured, and had no sooner put her nose in than she met the wasp coming out. I never saw any thing go off quicker than her head did; and she was served right, too.

Jenny. I should think she was, indeed,—the mean creature! I like the mason-wasp very well.

Wasp. Yes, she is a good, clever body, and very industrious, but terribly conceited. She cannot go to sleep, or even die, like anybody else. They sleep standing; and you may sometimes see their dead bodies standing beside their holes, as if to keep guard over their young: you might easily fancy them alive, but touch them and they will tumble into dust.

Jenny. Are there any other mason-wasps?

Wasp. Yes; there is a kind, rather common in this country, which make a nest of clay. You may have seen them upon the sides of rocks and upon the walls and roofs of out-houses and garrets. She moistens clay and

works it over and over till she has a lump of fine, well-tempered mortar about as large as a buckshot. When it is of a proper consisteney she flies with it to her nest and spreads it into the shape she desires, carefully smoothing it on the inside, and then returns for more. In the intervals of her labour she amuses herself with singing and running to and fro in the sun. As soon as her cell is finished and her egg laid, she goes to work catching spiders, which she disables in the same way as the sand-wasp does the caterpillar. Having crammed her nest as full as she can of this kind of game, she seals it up and goes to work to make another. The grub, having eaten all its provision, changes into a chrysalis, and remains in that state all winter. When spring comes, it changes once more, eats its way out of its prison, and comes forth a perfect wasp to construct new cells in its turn. Still another wasp eats only bees; and I have heard that there are so many in some places as to quite destroy the poor little candy-men,—which seems a pity, for, after all, they are harmless creatures. I never kill one myself without feeling sorry after-

wards, though they are very good, I must allow.

Jenny. It seems to me that wasps do nothing but mischief.

Wasp. That is a very narrow idea. In the first place, they live and enjoy themselves, which, I take it, is principally what they were made for. They are very amiable among themselves and very industrious, all working for the general good, and very fond of their young and of their mates. Then you are to take into the account how useful they are to men: and think of the number of blue-bottles, gad-flies, caterpillars and other disagreeable and hurtful insects one nest of them will destroy in a summer; for you may well think that it takes no small amount of provisions to supply a family of forty-eight thousand. One blue-bottle fly in a butcher's shop or a cellar will do more harm to your property than forty wasps; for he not only helps himself to what he wants, but spoils all he leaves behind him; whereas, if a wasp takes a sip from a glass of wine or a bite out of a lump of sugar, he does it in such a tidy way that the remainder is

none the worse, and if you did not see him you would never know he had been there. And, after all, how many people do we sting in the course of a season?

Jenny. Why, not many, to-be-sure; still those few rather object to it. But I have heard of insects called wood-wasps: what are they?

Wasp. Oh, they are not really wasps, since they have no sting, and not such strong jaws as we have; but I suppose there must be some connection in the families. They are hymenopterous insects as well as ourselves.

Jenny. What are hymenopterous insects?

Wasp. They are such as have four wings with large veins, jaws, and either a sting or a piercer for laying their eggs. These wood-wasps, as some people call them, have a borer,—at least the females have,—with which they bore holes in trees and deposit their eggs in them. It is a curious piece of machinery, consisting of two very sharp needles, or rather awls, working up and down in a kind of sheath. When it is not in use it is turned back and received into a groove in the under-side of the body. Her offspring remain a long time in the larva state,

and do a great deal of mischief to the timber by boring into it. I once heard of a nurse and some children getting a terrible fright from having half a dozen of the perfect insects come swarming out of the nursery-floor.

Jenny. I don't wonder they were frightened, I am sure. Are there any other hymenopterous insects—as you call them—besides those you have told me of?

Wasp. Yes, a great many,—more than I can tell you of or you remember. There are the saw-flies, who lay their eggs in the branches of shrubs, and whose young larvæ are often called false caterpillars, because they look so much like the true; the slug-fly, a pretty creature enough, but producing a slimy, mischievous and most evil-smelling worm; and the gall-flies, which produce the oak-apples and other galls, some of which are very useful to man. Your black ink is partly made from oak-galls brought from Asia.

Jenny. How do the flies make them?

Wasp. The female pierces the leaf or branch of the plant and deposits an egg. The wound causes the part to swell and become

spongy, and finally forms an excrescence or wart, sometimes in the shape of a ball, with a stem sometimes quite irregular in form, which in time becomes as hard as the wood itself. In this the little grub lives, eats, and undergoes his final transformation,—after which he eats his way out.

Jenny. I should like to see some of these galls: I wonder if I could find any.

Wasp. Yes, I presume so. They grow on a great many different plants, though I believe the oak produces more kinds than any other, and especially the red oak. Some of them are very pretty and curious. But I suppose I had better be off and leave this poor ruined nest, where we thought to have spent such a happy summer. There is nothing in it now but a few dead grubs and the body of our poor old foundress. I little thought last evening, as I was clinging to the comb by her side, that by this time on the morrow I should be a lonely wasp, without home or friend to call my own. But there is no use in complaining. You may hang the nest up in your cabinet without fear,

if you wish to do so, Miss Jenny: I assure you there is not a living creature in it.

Jenny. Will not the wasps come back to it next spring?

Wasp. Oh, no; no fear of that: we never use the same nest twice. Good-by.

The hornet is mentioned in Holy Scripture as one of the instruments of the divine anger upon the idolatrous and wicked nations of Canaan, and a means whereby they were to be driven out by degrees from the land promised to the seed of Abraham. There is, I believe, a degree of uncertainty attached to the meaning of the word translated hornet. (See Deut. vii. 20, Ex. xxiii. 28 and Joshua xxiv. 12.) Wasps I do not find mentioned. Any one acquainted with the fierce temper and venomous stings of these large insects can easily see how large swarms of them might almost depopulate a country. When I was in Vermont, I was very much annoyed by the white-tailed hornet. It came into the house in search of flies, but seemed to find something very attractive in my inkstand, and was constantly hovering around my desk

and my pen : one of them, indeed, met his death in the inky flood, and I laid out his body on the cover as a warning to his companions; but it did not answer the purpose, and at last I was fain to shut the windows whenever I opened my desk.

Reaumur succeeded in domesticating wasps under a glass shade, so that they carried on all their operations under his eyes, by which means he became well acquainted with their habits and manners. He gives quite an affecting account of their kindness to each other and the grief some of them showed at the loss of their nest. They hovered around the place where it had been for many days and searched every crevice for their lost companions. He declared that they never used their stings upon each other, and always divided their booty share and share alike with those who remained at home. Certainly, if glory among insects is to be measured in the same way as among men,—by the victories achieved and the results arrived at,—the mother-wasp of a settlement is entitled to much more “credit and renown” than the queen bee, inasmuch as she lays alone and

unassisted the foundations of the new nest, and attends upon the first brood of workers with the greatest assiduity, nor does she cease to set an example of industry as long as she lives. Neither can she be accused of any of those barbarous actions which are attributed with too much reason to the queen bee.

CHAPTER V.

A CURIOUS CATERPILLAR.

Jenny. DEAR me, Mr. Caterpillar, I almost stepped on you. What are you doing here, crawling on the rough gravel? I should not think you would find it very pleasant travelling.

Caterpillar. Ugh! Dear me! You may well call it rough. What people want to make such miserable barren places in their gardens for, I cannot imagine.

Jenny. But how did you come here?

Caterpillar. It is all the gardener's fault. I was living as comfortable as could be in the fennel-bed,* and the first I knew he came and cut it all down and carried it away. I thought perhaps he was going to burn it up, or some

* See note at the end of the chapter.

such thing; so I rolled off as fast as I could, and here I am.

Jenny. Poor thing! You must find it very uncomfortable. If you will crawl upon this branch of willow I will put you on the other fennel-plant which is not to be cut down.

Caterpillar. I am sure I am much obliged to you, child. Carry me carefully, if you please; for I don't want another tumble, and the robins are always after me. So, there! that's it. Now I feel easier. I do hope I shall be left in peace a little while now. What between birds and gardeners and the horrible ichneumon flies, one might as well be a June-bug.

Jenny. The birds trouble you a good deal, do they?

Caterpillar. Yes, indeed; they are always trying to eat me, and it is unknown what quantities of us they destroy. There is a nest of blue-birds in the orchard, and the old birds catch as many as thirty or forty in a day sometimes, to feed their young with. I wonder what they would think if I were to go round catching birds and eating them?

Jenny. They would think it very singular,

no doubt. But I should like to know what you do eat.

Caterpillar. I eat fennel and sometimes carrot-tops myself; but different branches of our family subsist upon different herbs, roots and trees,—some on potato-tops, others on willows, rose-bushes and so forth. Some varieties eat even the solid wood of the trunk, while others will only touch the tenderest sprouts. I have a cousin, very much like myself, who is never to be found except upon asparagus. He is one of the handsomest of the family.

Jenny. You are very handsome yourself, I think.

Caterpillar. Why, yes; without vanity, I think I may say I am. These two rows of yellow spots down my sides add very much to my beauty, and my four horns tipped with red are, I flatter myself, quite peculiar. Then these bunches of bristles upon my back add a certain majesty to my appearance and are a safeguard against the ichneumons. Now, with your leave, I will take a slight luncheon, for I have fasted much longer than I am accustomed to do, and feel quite exhausted.

Jenny. How curiously you eat! Your mouth appears to me to open the wrong way.

Caterpillar. How so?

Jenny. Why, it opens up and down instead of across your face.

Caterpillar. And why do you consider that the wrong way?

Jenny. I don't know, unless because it is different from our's. But probably it is the way most convenient for you. You certainly seem to make very good progress and to enjoy your food very much.

Caterpillar. Why, yes; I have got an appetite by my adventures,—though that is something I am not often without. I did not eat much yesterday, either; for I was occupied in changing my skin, which is a very fatiguing operation, though one feels better after it is over.

Jenny. Do you change your skin? How curious!

Caterpillar. Yes; we change our skin always twice, and sometimes three or four times. I expect to lose mine once more yet. The new suit of clothes grows under the old, and when it is quite ready I fix myself by my hind-feet —

firmly to a twig or branch. Then I twist and throw my body about in every direction, till finally the old skin splits down the middle of my back and I crawl out of it, leaving it all in one piece. I have sometimes a great deal of difficulty in extricating my legs; and I once knew a caterpillar who was obliged to leave one of his limbs behind him.

Jenny. That must have been very unpleasant. What did he do?

Caterpillar. Oh, he did not mind it much: he had enough more.

Jenny. How many legs have you in all, Mr. Caterpillar?

Caterpillar. I have six perfect legs, like all other regular insects. They are jointed, as you can see by looking closely, and have a hard, shelly covering; but besides them I have ten pairs of what you may call false legs. They are not like the others, being covered with a soft skin and not moving freely, but they are of great use to me in keeping my body from trailing as I walk, and in laying hold of a twig or whatever else I wish to sustain myself upon. When I become a butterfly I shall lose these

false legs and only retain the six perfect ones.

Jenny. So you expect to become a butterfly one of these days?

Caterpillar. Why, yes, of course; if I escape being eaten by the birds and all the other dangers that caterpillars are subject to, you will see me some day flying about with two handsome pairs of wings. All caterpillars become butterflies sooner or later.

Jenny. That seems so very curious to me. Worms and butterflies do not look in the least alike.

Caterpillar. Pray, do not call us *worms*. We are no more worms than babies are kittens. Worms live in the ground or in the water, and always remain worms till the day of their death; and they are not properly insects at all. Our proper name is *larvæ*: all caterpillars are *larvæ*; so are the grubs of beetles and the maggots of flies. If you will try to remember, I will tell you about our transformations; for they are very curious.

Jenny. I shall like it very much, if you will be so kind.

Caterpillar. I shall confine myself to the lepidopterous insects at present, as they are the most interesting. Can you remember that long word?

Jenny. I will try: lepidopterous. What does it mean?

Caterpillar. It means being covered with scales, and is given to us because our wings are so covered. I say us, you observe, because butterflies and caterpillars are really the same insects under different forms. In the first place, then, the caterpillar is hatched from an egg which was laid upon some plant proper for its food by its butterfly-mother. These eggs are very small, but often beautifully ornamented with dots and raised figures. Some of them are like little mustard-pots, with a round lid, which the occupant pushes open when he wants to get out.

Jenny. How does the butterfly know upon what plant to lay its eggs?

Caterpillar. I suppose the One who made the insect at first taught it to make a proper provision for its young by placing the egg upon the plant destined for it to eat. I never

knew one to make a mistake. The newly-hatched caterpillar is at first very small; but, as it begins to feed directly, it soon acquires a respectable size. Many caterpillars consume twice their own weight of food in a day; so it is no wonder if they grow very fast and are soon ready to change their skins. In this state they are called larvæ: don't forget that.

Jenny. How long do they continue larvæ?

Caterpillar. The time is very different in different species. Some eat for several months, or even two or three years, others only a few weeks. But at the proper time the caterpillar, who has hitherto employed himself chiefly in eating and lying still, becomes restless and uneasy. Sometimes he quits his habitation and descends into the earth; sometimes he seeks a fence or a rough stone wall abounding in angles and cavities; for, as he is likely to spend some time in a very helpless condition, he naturally desires a secluded situation. For my own part, I shall not leave the plant upon which I was born. As soon as I am ready for my change, I cease from eating and pass a day or two very quietly. Then I spin a strong

silken girth or string, which I pass over my back and fasten securely at both ends.

Jenny. How do you make your silk? Have you such a spinner as the spider's?

Caterpillar. No; mine is much smaller and more simple, and is placed directly under my chin.

Jenny. You must find it difficult to put the string over your back.

Caterpillar. It is, indeed, rather a troublesome operation, as the girth is composed of a good many different threads and must be strong enough to support my weight without danger of breaking.

Jenny. But suppose it should break, after all?

Caterpillar. That would be a great calamity; for, as I only have a limited amount of spinning-material, I could not make a new one. I should be obliged to repair the old one as well as I could, which would give me a great deal of trouble, and probably to no purpose, as I might not be able to secure all the threads so as to make a loop strong enough. Should it break again, I should not be able to help myself, but

must fall on the ground and die a miserable death.

Jenny. I am sure I hope you will not suffer from such a misfortune. But supposing the girth should be strong enough and every thing should go on well: what do you do next?

Caterpillar. I change into a chrysalis.

Jenny. Yes: but how?

Caterpillar. The manner differs in different individuals, but the principle is the same in all. Most caterpillars cast off their outer skins entirely by a series of curious manœuvres, such as bending their bodies into a bow and then stretching themselves violently, which causes the skin to split, as I said, across the back. The hinder part of the body then swells, and the crack opens more and more till the chrysalis draws itself out entirely. This is all that some of us have to do; but, if it happens to be one of the kind that suspends themselves, it fastens itself, by means of two hooks in its tail, to a little silk button which it has spun beforehand and attached to the plant. Its great desire is now to get rid of the old skin. In order to do this, it spins round and round with great ra-

pidity, and this cracks the threads by which the object of its dislike is suspended. The chrysalis of the butterfly is often very elegant in shape and colour, being ornamented with gold-coloured spots and lines or covered with a beautiful brown varnish. Some moth-caterpillars spin cocoons, or small egg-shaped cases of silk enveloping their whole bodies. Some of these are beautiful, being coloured with a very elegant golden yellow or silver white.

Jenny. Yes; I have often seen them hanging upon the roof of the wood-house and in the corners of fences, looking like little silky eggs. They are very pretty, I think.

Caterpillar. But do you know that your mother's satin dress, and your own silk apron, and many beautiful and valuable things besides, are all made of the cocoons of a caterpillar?

Jenny. What do you mean?

Caterpillar. I mean just what I say. All silk is made from the cocoons of a small white moth, which came originally from China or India,—I do not know exactly which. It is cultivated in many parts of the world, and even in this country.

Jenny. But how do they make the silk?

Caterpillar. I will explain the matter to you as well as I can. The caterpillar spins a cocoon in which he changes into a chrysalis. Then, before it is time for his final transformation, the person who has charge of the worms puts the cocoons into the oven and bakes them, in order to kill the poor little inhabitants.

Jenny. Why do they do that? It seems very cruel.

Caterpillar. It does seem very hard; but if they were to let the moth eat his way out he would cut the silk into short pieces, which would make it good for nothing. After the cocoons are sufficiently baked, the next thing is to wind off the silk, which is a very delicate piece of work indeed, as the threads are finer than any thing you can imagine. As soon as a sufficient quantity is collected, it is spun, coloured, and woven into silk.

Jenny. That does seem very wonderful, indeed. What do the silkworms eat?

Caterpillar. They eat mulberry-leaves. There are two kinds of mulberries growing in this garden,—one which bears a fruit very

much like a blackberry, and another with much larger and tenderer leaves, called the *Morus multicaulis*, which has been considered the most nutritious. I am told that the worms which produce the most silk and the best quality are kept in trays under cover and carefully fed twice a day with fresh leaves. They are very greedy creatures, and frequently eat so much as to kill themselves. A coarser and much more durable kind of silk is made from the cocoons collected from the wild mulberry-trees in their native country.

Jenny. It does not seem as though there could be silkworms enough in the world to produce all the silk that is worn for dresses and used up in other ways. There can be but very little silk in one cocoon.

Caterpillar. From three to six hundred yards, or something more than one-fifth of a mile. But think of the thousands of people occupied in taking care of them, and the thousands of acres of mulberry-trees cultivated for their food. In many parts of the world the silk-crop is the most important of all, and the inhabitants depend upon it for a living.

But while we have been talking about the silkworm we have forgotten the ehrysalis which we left hanging up on the plant or fence. It remains in this state perfectly quiet and still, for a longer or shorter period of time. Some pupæ are perfectly motionless and apparently without feeling, while others, like that of a brown step-worm which lives upon rose-bushes, have considerable power of movement, and, if disturbed, wriggle about in a very uneasy fashion.

Jenny. How long do they usually remain cocoons?

Caterpillar. It is incorrect to talk of their remaining cocoons, my dear. The cocoon is only the covering. The insect itself is called a ehrysalis, or sometimes a pupa. With regard to the time, some remain torpid only two or three weeks, and others as many months, or even a year. The great caterpillar of the goat-moth, which is very destructive to timber, lives three years as a caterpillar and only as many months as a ehrysalis. But they all turn into butterflies at last,—or rather the butterfly comes out of them; for it is a fact that the eaterpillar



1 Death Head Moth.
 2 Caterpillar. 3 Pupa. 4 Chrysalis of ditto.
 5 Acherontia atropos

in its larva state includes not only the skin of the chrysalis, but also the perfect butterfly—wings, trunk and all complete.

Jenny. They must be pretty closely packed, I should think. But tell me, if you please, about its final coming out.

Caterpillar. When the change is all complete and the butterfly ready to issue forth, it may be observed to move first the ends of its legs, then its head, and finally its whole body, which motions increase in rapidity till at last the skin which contains it splits down the back and breast and across the wings, and the butterfly appears. But you must not think he is all ready to fly at once. His wings are as yet damp, soft and full of wrinkles, and have very little strength. Presently, however, they begin to stretch themselves out; the colours grow more and more clear, and in about ten-minutes he is ready to set out upon his travels, a complete butterfly. He has now attained his full size, and has nothing more to do but to fly about, seek his mate, and then die.

Jenny. It does not seem, Mr. Caterpillar, as

though you ever *could* turn into a butterfly, you look so very different from one now.

Caterpillar. The difference is a much greater one than simply that of form, Miss Jenny. In my present state I am almost all stomach, and spend my time principally eating. In my butterfly state I shall have a stomach no thicker than a thread, and shall eat nothing more substantial than dew, or the honey that I shall pump out of flowers with my proboscis, which is a very delicate tube. But here comes an acquaintance of mine. Perhaps, Miss Vanessa, you will be so good as to show Miss Jenny your proboscis?

Butterfly. Why, really, Miss Jenny, I am not fond of children in general; but you do not seem as though you would run after me and drive me about like some girls.

Caterpillar. You may trust Miss Jenny, I assure you, my dear friend. She has just rendered me an essential service,—indeed, I think she saved my life; and I have had a very agreeable conversation with her.

Butterfly. Oh, I have no doubt of what you say; but if you had been agitated as I have you

would not wonder that I am nervous. I declare, every feather on my wings stood up straight from fright, and my claws tremble so I can hardly stand. I was comfortably seated on a scarlet verbena, sunning myself, and thinking how becoming the colour was to my complexion, when a toad made a spring at me and nearly caught me. I had hardly strength to get out of his way, and, as I dropped upon a clover to recover myself, a great, long-legged chicken came after me open-mouthed and had almost swallowed me. But, Miss Jenny, I beg your pardon for my incivility. I shall be happy to give you any information in my power.

Jenny. I am much obliged to you. You spoke just now of feathers on your wings. Now, I have often picked up dead butterflies, and I thought their wings were covered with coloured dust.

Butterfly. If your eyes were fine enough you would find that every particle of that dust was a beautifully-formed plume, or rather scale; for, though they are shaped like feathers, and are fastened to the wing in something the

same way, they have, in reality, much more the nature of scales. There are sometimes four hundred thousand of these scales upon the wing of a single little moth. They are arranged in double layers upon each side of the wing, the lower layer being usually white; and it is to these that all the beautiful colours are owing. The wings themselves are thin and gauzy, with branching nerves, like those of the great, horrid dragon-flies. There is a class of lepidopterous insects called clear-wings, who have none of these scales; but I really think they ought not to be considered as butterflies at all. I should think, for my part, that they would be ashamed to go about in that undressed way. They are very mischievous creatures, too, and their caterpillars destroy a great many peach and other trees by boring into the roots. Is there any thing else you would like to inquire about?

Jenny. About your proboscis, if you please.

Butterfly. Oh, yes. Well, you see how I curl it up when I am not using it. I will stretch it out for you to look at.

Jenny. It looks like a thin black thread.

Butterfly. But you must know that this thin black thread is composed of three separate tubes. The two outside ones are round and very small, but the middle one is square and formed of the junction of the other two. It is through this middle tube that we suck the juices of the flowers, as you might suck water through a straw.

Jenny. That is just the way the elephant uses his, only his has a finger on the end, with which he picks up things that he wants to put in his mouth. But that would be useless to you, I suppose, as you do not want to pick up things.

Butterfly. I never saw an elephant. Do they eat honey?

Jenny. Oh, no; there would not be honey enough in the world for them if they did.

Butterfly. I suppose they are a good deal larger than insects?

Jenny, (laughing.) The one that I saw was larger than that tool-house, Miss Vanessa. But tell me, are there not some butterflies that only come out at night?

Butterfly. Those are moths, my dear,—not butterflies.

Jenny. What is the difference between them? They look very much alike.

Butterfly. Most moths fly only by night, though there are exceptions to the rule. The currant-moth, for instance, flies by day, and so do many of the sphynxes, which are those pretty creatures that you sometimes see fluttering over flowers and looking like small humming-birds. They have thick, downy bodies, long, narrow wings and often a short fan-like tail, which increases the resemblance to a bird. The bodies of most moths are thicker and more downy than those of butterflies, and they carry their wings flat when they are at rest, while those of butterflies stand up straight. But the chief distinction is in the horns or feelers. If you look closely at mine you will see that they are much thicker at the tip than at any other part, and stand out straight, while those of moths taper towards the end and usually curl outwards. You may tell us apart in the pupa state from the fact that the butterfly chrysalis is always angular,—that is, it has

sharp corners,—while that of the moth is smooth and rounded and tapers to a point. Look at that pretty little primrose-coloured creature under the rhubarb-leaf, and see if you can tell to which class she belongs.

Jenny. Let me see : she has broad flat wings, and they are not very downy; but her body is thick and soft, and her horns are short and turn outwards. They are much thinner at the tip than at the base, too. I think she must be a moth.

Butterfly. You are quite right: she is the moth of the small green geometer, and one of the prettiest of the family.

Jenny. Why are they called geometers?

Butterfly. Really, Miss Jenny, what between my fright and the labor of answering so many questions, I am quite fatigued. I must go and drink some honey before I shall be capable of any more exertion; but my cousin here has taken a comfortable meal while I have been talking, and, I dare say, will be glad to continue the conversation with you.

Caterpillar. With all my heart. A little rational conversation, like your own, Miss

Jenny, is a great relief after the frivolous gossip of most of the butterflies and moths that one meets. What were you inquiring about?

Jenny. About the geometers. Why are they called so?

Caterpillar. Because they seem to measure the ground they walk over. When a geometer wishes to pass from one place to another upon a branch or leaf, he stretches his body to its whole length in the direction he wants to go. Then, planting his fore-feet firmly, he brings the hinder ones up to them, thus bending himself into the form of an ox-bow. Then he stretches out his head again, and again brings up his hind-feet, and thus contrives to walk at a very good rate. Nor is this all. If you will closely watch one of these step-worms, as they are commonly called, you will see that he always carries a silken thread with him, with which he seems to measure the ground he passes over, as a surveyor does with his chain. Its real use is to prevent him from getting a disagreeable fall if he should chance to be shaken from the bough where he lives, and it

also serves the purpose of an excellent rope-ladder in case he chooses to descend of his own accord. He has the power of stopping his descent at every three or four feet, by contracting the orifice from which the silk issues; and when he wishes to return he does so very easily, by doubling up the silk into a skein which he holds very closely between his hind and fore feet. When he is not eating he is usually to be found holding on to a leaf or branch with his body stretched out straight and stiff into the air, looking almost exactly like a small twig. This habit is very useful to him, and often saves him from the bills of birds and the tender mercies of the gardener whose rose-bushes he devours. He changes into the pupa state without spinning up, and remains torpid about four weeks.

Jenny. I do not think moths are usually so pretty as butterflies,—they are always so much smaller and duller in their colours.

Caterpillar. You are mistaken about that, Miss Jenny. There are some moths which are larger than any butterflies I know of. The Atlas-moth of China measures nine inches

across the wings; and another,—the Owl-moth, —though its wings are rather narrow, measures eleven inches, or nearly a foot, when fully expanded. There is a beautiful pale-yellow moth, which flies only by moonlight, that is larger than some of the largest butterflies, and another pale-green one which is almost equal to it. As a rule, their colours are not so vivid; but they are beautifully marbled and mottled, and often ornamented with gold and silver. To my mind, however, the white twenty-plume moth is the most lovely of all: it is of a snowy whiteness; and its wings, instead of spreading out broad and flat, are composed of diverging rays, like plumes: hence its name. It is rather a rare insect; but you may perhaps get a sight of it if you keep your eyes open.

Jenny. I mean to keep watch for one. Will you please to tell me more about the different sorts of caterpillars?

Caterpillar. I shall have great pleasure in doing so, my dear. There is a species of caterpillar found in foreign countries, especially in France, called the processionary caterpillar, from its mode of travelling in search of food.

When young they have no settled place of abode, but wander here and there upon the trees. When they have attained about two-thirds of their growth, however, they associate themselves, and weave a tent for their common habitation and to shelter them in rainy weather. From this tent, about sunset, the regiment comes forth. First appears one single caterpillar, then two side by side, then three, then four, and so on: sometimes three single ones will lead the way,—in which case the next three files consist of two, &c., always observing an exact order. Their movements are all regulated by those of their chief: if he stops, they stop: if he ascends to a certain height, they do the same, each going to exactly the same place before he begins to descend. They return in the same regular order. If the first caterpillar of the line is touched, he stops and appears very much frightened, and all the others come to a halt and make exactly the same motions, as though they had a perfect sympathy. There are several varieties of the processionary caterpillar, one of which spins a carpet of snow-white silk to march upon, so that they re-

semble a broad golden ribbon spread out on a silver ground.

Jenny. I really should like very much to see them.

Caterpillar. I would advise you not to touch them or go very near them, as the short stiff hairs with which they are covered have an exceedingly irritating quality, and, if they get upon the skin, often cause troublesome swellings or inflammation of the eyes. Some of the hairy caterpillars in this country have the same property; and it is generally best to be careful in handling them.

Jenny. Are there any other caterpillars, besides the processionary moths, which make curious houses?

Caterpillar. Yes; several. One species makes itself a coat from pieces of leaf. It is a small moth, which feeds upon the foliage of plants. Having consumed the soft, pulpy parts of the leaf which constitute its food, it proceeds to cut out two pieces which form the upper and under side of its cloak. Having made them of exactly the right shape, it goes on to baste them together and try them on. You laugh,

as though you fancied I was joking; but it is literally true. It fastens the pieces together loosely at certain points, leaving the spaces between them open, and then twists and moves its body about in every direction till it ascertains to its satisfaction that its new garment fits exactly. It then proceeds to sew the sides together with silken threads, and in about twelve hours the whole is completed. Another moth makes a silken coat and covers it with short bits of grass arranged like the shingles of a house; and still another uses bits of wood for the same purpose. There are others which roll up leaves and make curious little tents of them, which they move from place to place as they travel.

Jenny. I have heard mother talk of the moths getting into her furs and blankets: is that a kind of caterpillar?

Caterpillar. Yes; and a very ingenious one, too. It composes its garments of the hairs or threads of the cloth or skin on which it lives and feeds. Thus, a moth which lives upon a piece of blue cloth will have a blue coat; but, if he happens to remove from that to a red

one, the ends and perhaps the sides of his garment will be red. He lengthens his clothes very easily by adding new hairs to either end; but if he desires to widen them he must take a different course. He splits the garment half-way down, and, widening the rest as much as he pleases, he fills it up with the same material, and proceeds in the same way with the opposite side, only beginning at the other end. When he is ready to turn into a ebrysalis, he merely closes up the ends of his ready-made cocoon and fastens it to the cloth by a few threads which he spins for the purpose.

Jenny. Are cocoons ever made of any thing besides leaves and silk?

Caterpillar. Oh, yes. The puss-moth, which is found upon the willow, makes her's of bits of bark, which she gnaws off with her strong jaws and cements together with gum and silk, forming a case so hard that it can scarcely be cut with a knife. It adheres to the tree, and, being of the same colour, easily escapes detection. The great goat-moth, of which I spoke before, scoops out a hollow in the tree which serves at once for its food and its habitation, and lines it

with a warm curtain composed of wood raspings and silk matted together. The green potato-worm, which turns into a beautiful and very curious moth, retires under ground and hollows out a commodious little cave or cellar in which to undergo its transformation. The small marbled green moth, which lives upon mosses, covers its cocoon with them as the humble-bee does his nest. In short, every different species of caterpillar has its own way of managing its matters; and they very seldom make mistakes.

Jenny, (hesitatingly.) I am thinking, Mr. Caterpillar, if you would not mind it much, I should like to take you into the house and keep you in my nice glass box. There the ichneumon flies and the robins could not get at you, and you could spin up in peace.

Caterpillar. Why, really, Miss Jenny, I don't know. I am afraid I should not get any thing to eat.

Jenny. Indeed, you need not be afraid. I would give you clean fresh leaves every day from this very plant, and plenty of air. I never forgot once to feed my bird, and I have

had him more than a year. I kept a caterpillar, too, last year, and it never seemed discontented at all; and this spring it came out a beautiful butterfly. Do let me try; and if you do not like it I will put you back in the same place again. See, there is a robin looking for a worm now.

Caterpillar. Oh, well, I think I will try it, provided you will promise to let me go when I come out a butterfly.

Jenny. I will, truly. Now let me get my box and put you in. There you are, safe and sound, with plenty of fresh leaves for to-day; and early in the morning you shall have more.

Caterpillars are very contented in captivity, and seem to enjoy their food as much as though they gathered it for themselves. It is very interesting to keep one of the larger kind in a box covered with glass and watch his operations. Care should be taken to give the prisoner plenty of air, to remove all the dry and decayed leaves, and to supply him twice a day at least with fresh ones taken from the plant upon which he is found. If the potato

or tobacco worm is kept, he should have a couple of inches of fine earth (not sand) at the bottom of his box. A very handsome and curious variety, with black velvet bands and gold-coloured spots, is to be found upon smallage and parsnips, and a still more curious one, covered with bristles, is sometimes to be found upon fennel and asparagus. They should not be moved or shaken about much, especially when they begin to spin, as a breakage of their thread is a great calamity to them.

The ichneumon flies, of which Jenny's friend complains so bitterly, are small and very active winged insects, armed with a long sting, by means of which they deposit their eggs in the flesh of the undefended caterpillar, who tries in every way, by twisting his body, erecting his bristles, &c., to escape his enemy, but usually in vain. The eggs are soon hatched, and the young ichneumon begins to consume the flesh of the poor caterpillar, carefully avoiding all the vital parts. The miserable victim, unable to help himself, pines away and dies, often without becoming a chrysalis at all. Should he reach the third stage of his existence, how-

ever, he is destined never to quit it; and many a collector of butterflies has been disappointed when his fine cocoon produced nothing but a brood of miserable ichneumons.

Caterpillars are among the most destructive of insects, and there is scarcely a plant which escapes their attacks. Even the disgusting-tasted green tobacco has its particular worm, which is often very injurious to the crops. The ravages of the cabbage, the apple and the potato worm are too well known to need description. The larvæ of the *Egeria* or clean-wings have their habitation in the wood of peach and other fruit trees, through which they bore in every direction. They are very pretty insects; but many of them look much more like wasps than butterflies.

Some of the larger caterpillars are formidable-looking creatures, being armed with long horns or bunches of prickles; but they are almost all entirely harmless, except to the vegetables they feed upon. There are a few which have a stinging property, like that of the nettle, but none which are decidedly venomous,—at least in this country. Some

years ago an alarm was raised that the caterpillar of the *Antiopa* butterfly, found in great numbers upon the poplar and elm, was very poisonous: stories were circulated of children being found dead under poplar-trees with these insects crawling upon them, and many noble rows and avenues were sacrificed to this absurd prejudice. The truth is that the caterpillar, though an ugly and formidable-looking creature, is quite harmless, and may be handled without the least danger: the only mischief it does is in stripping off the leaves of the trees upon which it feeds.

We have many very beautiful butterflies and moths in this country, and very large collections have been made in single States alone; but they do not compare, either in number or splendour, with those which are found in tropical climates. South America is very rich in them, and many of the specimens are of astonishing size and beauty. The following extract from Lander's Expedition to the Niger will serve to show the numbers that exist in Africa. Speaking of a beautiful glen through which they passed in their travels, he says,

“There was one sight, however, which we would not omit mentioning for the world. It was that of an incredible number of butterflies fluttering around us like a swarm of bees. They were variegated by the most brilliant tints and colours imaginable: the wings of some were of a shining green edged and sprinkled with gold, others were of sky-blue and silver, others of purple and gold delightfully blended into each other, and the wings of some were like dark silk velvet edged and trimmed with lace.” In another place he says, “Millions of butterflies fluttered round us, and literally hid every thing from sight but their own variegated and beautiful wings.”

Andersen, a late traveller in South Africa, mentions the same phenomenon.

Butterflies and moths have been the object of a variety of superstitions. The Death's-head moth—a large species of hawk-moth, so called from bearing a mark resembling a human skull upon its shoulders—has caused great alarm to ignorant people by its singular appearance and by its power of emitting a plaintive creaking sound when frightened in any way. Its ap-

pearance in or near the house is regarded as foretelling the approaching death of some of the family. It is very likely to foretell the death of the poor insect itself, if there happens to be a cat about the premises. Puss, either from an impulse of curiosity, or mistaking it for a bird, knocks it down with one pat of her nimble paws, and is seldom satisfied till she has pulled it to pieces.

The destructive habits of caterpillars are often alluded to in the Bible, where they are several times mentioned as the direct instrument of the divine anger against sin. Thus, in Deuteronomy xxviii. 39, among the curses denounced against Israel in case of rebellion against the Almighty, "Thou shalt plant vineyards and dress the vine, but thou shalt neither drink of the wine nor gather the grapes; for the worms shall eat them." Again in Joel i. 14:—"That which the palmer-worm hath left hath the locust eaten; and that which the locust left hath the canker-worm eaten; and that which the canker-worm left hath the caterpillar eaten." In the prayer of Solomon at the dedication of the Temple, the

caterpillar is mentioned together with pestilence, mildew, blasting and locusts, (1 Kings viii. 37.) The moth is often referred to; and, in a country where much of the wealth of the people consisted in woollen garments and furs, the ravages of this troublesome insect were likely to be formidable enough to attract much attention.

Note to p. 139.—A lady has informed me that she was once severely bitten on the arm by a caterpillar,—one of the species found upon fennel. It had escaped from captivity, and was walking about on the table, when she incautiously laid her bare arm upon it. She describes the bite to be like the prick of a darning-needle, and it was followed by considerable pain and swelling.

CHAPTER VI.

THE BEETLES.

Jenny. You clumsy, blundering creature why do you come flying in my face in that awkward way? Do you think it can be agreeable to have a monstrous beetle come booming round one's ears and thumping against one's forehead when one is sitting quietly upon the front step to enjoy the moonlight?

Beetle. What is the use of calling such hard names, Miss Jenny?

Jenny. But why do you do so? There you go, plump against the side of the house, and now down upon your back. Take hold of this straw and I will help you up. Are you blind?

Beetle, (shortly.) No more blind than yourself.

Jenny. Well, all I can say is, I don't admire

your choice of an amusement; but I really always supposed that beetles were blind. I am sure I have heard people say, "You're as blind as a beetle."

Beetle. If they are blind, how does it happen that they always fly towards the light?

Jenny. To-be-sure: I never thought of that.

Beetle. I would think, then, before I called a harmless insect names. No; we are not blind, but our bodies are very heavy in proportion to the size of our wings, and when we once get started in a certain direction it is not easy for us to change our course. So, if a house, or a little girl, or any such object, come in our way, we are very apt to fly against it, and, I must say, I think it is much more our misfortune than our fault.

Jenny. It seems to me that four wings is a pretty good allowance for an insect of your size.

Beetle. I have only two wings, child.

Jenny. What are those brown things growing out of your back?

Beetle. They are my wing-cases,—or elytra, as they are more properly called.

Jenny. What is the use of them?

Beetle. They are to protect the true wings, which, as you see, are of a very delicate gauzy texture, and which would be very liable to injury in the life we lead, if they were not protected. It is from these wing-cases that we derive our family name of Coleoptera, which comes from two Greek words signifying wings in a sheath. The Coleoptera is the largest order of insects, and is supposed to contain more than thirty thousand different species, varying in size from the great Pironeus of Brazil, which is half a foot long and measures nine inches across its extended wings, to a little creature not so large as a grain of sand.

Jenny. What a number of kinds! I did not suppose there were so many different insects in the whole world, taking them all together. But I never saw a beetle anywhere near to six inches long.

Beetle. No; we have none quite so large in this country: but the stag-beetle—or pinch-bug, as some call him—attains a very respectable size.

Jenny. Yes, indeed. The first one I saw

crawling upon the floor I thought it was a mouse. What a fierce-looking creature he was, with his great pincers! He looked as though he could bite one's finger off as easily as not.

Beetle. There is no great danger of his biting, except by mistake; for, though he might happen to give your finger a good pinch, especially if he were frightened, he is rather a harmless creature, and never eats any thing but the juices of trees and plants, which he pierces with his strong jaws.

Jenny. You are not very small yourself.

Beetle. No; I flatter myself that, for a June-bug, I have attained a very respectable size; and so I ought, for I was long enough about it. It seems very strange to me, now, that I should have been contented to live under the ground as long as I did.

Jenny. So you used to live under ground, did you?

Beetle. Yes, when I was in my larva state; and a stupid state it was; nothing to do but eat and sleep, eat and sleep, all day and all night. I was not then the hard, brown, elegant-looking insect I am now, but bore the form of



Cerambyx Heracles
Heracles Beetle of America

a very awkward, clumsy, white grub. In this state my food consisted of the roots of grass and grain; and I am afraid the farmer was not very fond of my company in his meadows.

Jenny. How long did you remain in the larva state?

Beetle. About three years. I then made my way upward, and, when near the surface, I constructed a cocoon of earth, in which I changed into the perfect insect you now see me. And I assure you, Miss Jenny, in spite of the ugly names you called me just now, a beetle is a very perfect insect indeed. To-be-sure, we have not the lightness which characterizes the frivolous race of butterflies and moths, nor do we lay up honey for other people to eat; but perhaps we are as useful in our way as any member of the insect-family. Not that I mean to apply that to myself, however. I am not one of the working-beetles, and I am sure I would rather go without fresh meat to the end of my days—indeed, I never eat it—than take as much trouble to supply myself with it as my cousins, the carnivorous beetles, do.

Jenny. What is the meaning of carnivorous?

Beetle. It means meat-eating. There is a large tribe of beetles which subsist upon the flesh and juices of other insects, which they are enabled to catch by the great rapidity of their motions and the strength of their jaws. Many of them are very handsome creatures; but I should think more of them if they would confine themselves to eating caterpillars and grubs. It does not look very well for beetles to devour beetles.

Jenny. In what way are beetles useful to men?

Beetle. One way is in acting as scavengers, and removing from the surface of the earth such substances as would taint the air, and perhaps produce sickness if allowed to remain and decay. Some beetles devour dung; others eat toadstools, and others fungous plants; others inhabit decaying wood, and help to reduce it to powder by their boring and mining. Did you ever hear of the burying-beetles?

Jenny. No; I do not think I ever have. Why are they called so? Because they bury things?

Beetle. Yes; for that reason exactly. They

bury the bodies of birds, mice, and such small creatures as they find lying upon the ground.

Jenny. I am sure it is very good in them to do it.

Beetle. Oh, you must not think they do it out of good-will they have toward mice and birds. It is in order that they may lay their eggs in the dead bodies.

Jenny. But why could they not do that as well above ground?

Beetle. Why, don't you see that if they remained upon the surface the rats and crows and other carrion-eating creatures would carry them off? And then what would become of the poor little beetles?

Jenny. Very true: I see it is quite necessary that they should be buried. But it must be quite a task. Pray, how large are these ingenious little sextons?

Beetle. They are quite small,—not as large as I am. I once heard of a gentleman who wished to try some experiments with these beetles. He took two pairs of them and placed them under a glass shade, in a box half full of earth, giving them two frogs, which they

buried in twelve hours, each pair working by itself. He then gave them a dead bird, at which they soon set to work. They began by pushing out the earth from underneath, so as to make a hole for its reception. Then the male chose to drive away the female and finish the work himself. He lifted up the bird, changed its position, and arranged it more conveniently in its grave, at the same time trying, by pulling at the feathers of the bird, to drag it deeper down. In two days the carcass was safely entombed. When it was all covered, they laid their eggs in it and left them to be hatched.

Jenny. Poor little fellows ! It seems rather a pity that they should have to work so hard.

Beetle. Oh, they do not mind it. They are brought up to it, and I think they rather enjoy digging and toiling in the dirt. But there is another class of beetles which are even more industrious: I mean those called pellet-beetles and sometimes tumble-bugs.

Jenny. What a curious name !

Beetle. They are curious creatures; and I have heard, from excellent authority, that a

branch of the family was once worshipped in Egypt. I should like to know whether the butterflies, who think so much of themselves, ever had divine honours paid to any of their race.

Jenny. I must say, Mr. Beetle, that I think it was no great honour, since cats and birds, lizards, and even onions, shared the same distinction. But what is there so remarkable about these distinguished ancestors of your's?

Beetle. Oh, they are not my ancestors,—only connections of our's. None of my family ever pursued any laborious occupation. But these are very industrious little creatures, and so amiable in their manners that the family are rather proud of them.

Jenny. But why are they called tumble-bugs?

Beetle. From their curious manner of disposing of their eggs. They are not satisfied with merely burying them, as many beetles do, but form, with great skill and industry, balls of dirt, well kneaded together and perfectly round and smooth. In each of these balls, the female beetle lays one egg, and then male and

female unite to roll it to the place they have provided for it,—which is a hole, often some distance off, excavated to the depth of three feet.

Jenny. Is it possible that such little tiny animals can dig a hole three feet deep?

Beetle. As I told you, they are never weary of working. The hole being prepared, the next thing is to roll the ball into it. This is accomplished, as I remarked before, by the united labours of male and female. They push backward with their hind-feet and claws; and, should the load prove too heavy for them, the next who comes along will take hold and assist, and thus several may often be seen pushing at one ball. When the road happens to lie up hill, the work is very hard, and they are sometimes compelled by fatigue to abandon their treasure,—in which case the next party of beetles who come along attack it, and do not leave it till they have deposited it in a place of safety. In short, whenever a tumble-bug finds one of these balls, he goes to work at it, and takes as much pains to secure it as though it were his own. Though very timid at other times, there is no limit to their courage when engaged in this duty, and

no interruption will drive them away so long as they are able to stand.

Jenny. I like these cousins of your's very much, Mr. Beetle. I think some larger people might take a lesson from them.

Beetle, (with a significant look.) Yes,—some little girls, for instance, who do not at all like being asked to go for a pitcher of water when they are dressing their paper dolls.

Jenny. But I did go, after all, Mr. Beetle, and I took care of the baby all the afternoon, too.

Beetle. I am glad that you did, child; but I would have you remember that service cheerfully given is twice given.

Jenny. What becomes of the tumble-bug's eggs after they are hatched?

Beetle. The larva eats out all the inside of the ball, which then serves him for a cocoon, in which he changes into a chrysalis, and after a while comes out a beetle.

Jenny. And what do you do with your own eggs?

Beetle. Oh, I lay them in the ground and leave them to take care of themselves. I can-

not see the use of making such a fuss. Our eggs always do as well as those of the tumble-bugs. But, talking of celebrated insects, there is another of our family, who, though he has not made so much noise in the world as some people, has the honour of having his noise always attended to. You have heard of the death-watch?

Jenny. Yes, and how people are always alarmed when he ticks. Why are they so afraid of him?

Beetle. Because they think his clicking is a sign of a death in the family. But that is all the greatest nonsense. This beetle is a harmless, domestic little creature, and only clicks when he desires to call his wife, of whom he is very fond. If he does not find her directly, he lifts himself up and knocks his little hard head three or four times against the post or beam which forms his house. Then, if she is within hearing, she answers; and if not, he knocks again. That is the whole story of the death-watch, whose family conversation has, I really suppose, frightened more than one person out of the world.

Jenny. There is one question I should like to ask, Mr. Beetle. I should like to know why you always fly into the light. All your family are constantly getting into trouble by dashing into candles and fires and against windows; and the other night, coming home from church, I saw a perfect cloud of June-bugs around a gas-lamp, knocking their heads against the glass in the most ridiculous manner, as though they were determined to get in and burn themselves to death at any rate. Why do they do so?

Beetle. Why, really, there is a curious story about that. Of course there is no truth in it, as no beetle would be so ridiculous——

Jenny. But what is the story?

Beetle. The story is this. A certain kind of beetle is said to be so remarkably beautiful that all the other insects fall in love with her as soon as they see her; and, in order to get rid of them, she tells them to go and fetch fire to prove the strength of their attachment. The foolish fellows rush off to the nearest fire or candle to obey the commands of this wicked little beauty, and of course fall in and burn

themselves to death.* But of course that is all a humbug. As you say, the fact is, all people have their weaknesses. For the life of me, I cannot help flying towards the light if I see one; and many a time have I bumped my poor head against the glass trying to get into the parlour. But you will observe, when I do get in, I am generally satisfied with flying round and round the white ceiling, though I now and then drop upon the table. I do not see why your mother should object to me so much.

Jenny. I believe it is only because you look so much like a cockroach.

Beetle. But I am not like a cockroach, and it is a very great injustice to compare me to such a thieving, dirty, disgusting creature. Pray, when did you ever know me to get into the pantry and devour the cold meat, or drown myself in the buckwheat-cakes, or eat wet woollen stockings? Did you ever hear of my nibbling sick people's fingers and toes, or eating holes in the merchant's broadcloths and gauzes?

* I find this curious item of natural history in the Naturalists' Library, quoted from some old author.

Jenny. Then he is not a relation of your's, as I always supposed?

Beetle. No, indeed: he is first-cousin to the crickets and grasshoppers, who pride themselves so much on their musical powers. Beetles, for the most part, mind their own business, and do not go prying and stealing into store-rooms and drawers, and such places.

Jenny. But, to leave the cockroach for the present, are any of your family really so very handsome as the beetle with many lovers is represented to be?

Beetle. Oh, yes. Some of them are so magnificent in their colours, and shine with such a lustre, that their wing-cases are set in gold and worn for ornaments; and the ladies of Brazil frequently make necklaces of them. Even in this country are to be found beetles of remarkable beauty. What do you think of a beetle that carries a lantern about with it and displays a brilliant light wherever it pleases?

Jenny. Is it possible that the beautiful little fire-flies are relatives of your's? I think they are the loveliest little creatures! The currant-

bushes looked fairly on fire with them last night.

Beetle. Yes, we are own cousins, and you will see the familylikeness if you examine them. I think, myself, it is quite beautiful to see them dancing among the leaves in the evening, flashing their dark lanterns every now and then. Those which you see about here are quite small, and their light is only a tiny spark; but in the West Indies and other warm countries is to be found a much larger and more splendid variety, sometimes called the lantern-fly, though this name properly belongs to a luminous insect of quite another family. One of these luminous beetles will give light enough to read small print by, and it is said that half a dozen of them will light a room. They subsist upon gnats, mosquitos, and other small insects, of which they destroy a great many; and they are sometimes caught and let loose in sleeping-rooms, to rid them of these troublesome creatures. They fly one after the other in long lines, and must present a very beautiful appearance. Little girls sometimes fasten them to their white muslin dresses by means of their hooked

feet, and thus decorate themselves with a fringe of fire. I have heard, too, that ladies confine them in gauze nets, and thus decorate their heads with them for evening parties.

Jenny. They must look very pretty; but I do not think I should fancy such living ornaments dangling and buzzing about my ears. Are there any other luminous beetles?

Beetle. Yes, several; but these are the most remarkable. The glow-worm, which is very common in England, but quite rare in this country, belongs to the beetle family.

Jenny. Why is it called a worm?

Beetle. Because the female, who is the principal shiner, has no wings, and resembles a worm or caterpillar in form. The male glow-worm has wings, and is in all respects a perfect beetle; but his light is feeble and intermittent, and does not compare with that of his humble mate, who never stirs abroad.

Jenny. I should like to see a glow-worm. I mean to keep a sharp look-out and see if I cannot find one some evening. Are there any more beetles which are useful to man?

Beetle. There is one way in which they are

very useful, and I think you will hardly guess how. Did you ever see a blistering-plaster?

Jenny. Yes; the doctor put one on my side when I was sick last winter. I shall not forget it very soon,—though, after all, it was not so bad as the pain which it removed. But what has that to do with beetles?

Beetle. That very plaster was made of the pounded bodies of a kind of beetle found in Spain and in some parts of this country, called the blistering-fly, and sometimes the Spanish fly. Their proper name is Cantharides, and there are many different kinds of them, both in this country and abroad; but the one in common use is one of the most elegant of the tribe, having wing-cases of the most beautiful bluish-green, which shine with a lustre like polished metal. They are shaken off the branches on which they collect and killed by being held over the steam of boiling vinegar: they are then thoroughly dried and sold to the druggists, who mix their pounded bodies with lard to make the common blister-salve.

Jenny. I wonder who first discovered the use of them?

Beetle. I do not know; but I believe their use is very ancient. Your little friends the lady-birds—or lady-bugs, as you call them—are also beetles, and make themselves very useful by destroying plant-lice, or aphides, which, you know, are very injurious to plants. The lady-birds eat them both in their larva and in their winged state, and that is the reason you so often find the pretty little creatures on rose-bushes, where, too, you may often see another very pretty little beetle,—the rose-chaffer, or rose-bug.

Jenny. "If handsome is that handsome does," as the proverb says, I am sure I cannot admire the rose-chafers, for they are the most mischievous little plagues in the world. It seems as though they were determined to gnaw and destroy the very finest rose-buds.

Beetle. Well, the poor things do not mean any harm. The only use they know for roses is to be eaten; and I dare say they think you are very mischievous when you brush them away from their pretty pink cradles. But there is one branch of the family for whom you

nave not inquired. I mean the snapping-beetles, or Elaters.

Jenny. Oh, yes. I know what you mean :—those curious little bugs which snap themselves up into the air when they happen to fall on their backs. I have often wondered how they do it.

Beetle. They have a contrivance on purpose. The hinder part of the breast—or sternum, as it is called—is lengthened out into the shape of a sharp spine or thorn, which has a hole made on purpose to receive it. When the beetle happens to fall upon his back, he bends his head and breast backward, and suddenly forces this spine into the hole, which causes him to spring upward with considerable force, when he almost always comes down right side up. There is a large dark-gray beetle, found upon the edges of woods and curiously marked with an oval of gray upon each side of his head, which possesses this property in a remarkable degree.

Jenny. Yes ; I have often had them come down on a basket, or something I was carrying, so suddenly as to quite startle me. Then they would lie as still as if they were dead,

for a moment or two, when—pop!—off they would go again. I think they are very handsome : don't you?

Beetle. Why, yes, tolerably handsome,—though their legs are too short for my taste.

Jenny. How do beetles defend themselves from their enemies? for I suppose they have enemies?

Beetle. Oh, yes, enemies enough, poor things! from which they defend themselves in many ways. Some of them, when touched or alarmed, fall on the ground and pretend to be dead. In this situation they cannot be made to move a limb, no matter what may be done to them; and thus they often save themselves from the clutches of birds, who only eat them alive. Others have a very disagreeable odor when touched, or give out a liquor which burns like caustic. But the most curious of all is the bombardier beetle, which shoots at its assailant.

Jenny. Shoots at him! Now, Mr. Beetle, I am sure you must be joking. How can a beetle shoot?

Beetle. How he does it I cannot tell you;

but he certainly does, and he can fire many shots in succession without exhausting his ammunition. He is found, under stones and in gravelly places, in France and England. He is very often pursued by the carnivorous beetles; and, as they run very fast, and he is a very heavy and clumsy insect, you would think at first he had no way of escape. But, should his enemy press him too closely, suddenly a loud explosion is heard, and a blue smoke is seen, attended by a very sharp and disagreeable smell, which soon brings his pursuer to a stand. He can repeat this discharge twenty times if necessary, and thus make good his escape under some friendly stone or root. By bending his body he can direct his fire to any point he pleases,—so that he is really a very respectable shot. In lifting up a stone in a gravelly place where the bombarder resides, you may sometimes hear twenty or thirty of these little guns discharged at once.

Jenny. That is very curious, certainly. I wonder whether there are any such beetles in this country? I should like very much to see them fire their little pistols.

Beetle. I rather think none of them have yet been found in this country; but perhaps, by keeping your eyes open, you may be the first to discover them. That would be quite an honour for a little girl. Have I told you any thing about the water-beetles?

Jenny. No, I believe not. I am quite sure I never heard of them. Do they live in the water?

Beetle. Yes, in the water and on it; for, as they breathe air, like other insects, they are obliged to come to the top of the water every now and then to breathe. Besides, many of them jump out of the water as soon as it is dark, and fly about all night catching flies; for they are extremely ferocious, and devour all sorts of insects without mercy, both in the larva and in the perfect state. They swim by means of their hind-legs, which are long, powerfully formed and covered with long stiff hairs. When they wish to ascend, they have only to stop swimming, and the lightness of their bodies brings them to the surface at once. The larvæ are almost always to be seen hanging heads downward, with only their tails at the

surface of the water. They are very fierce and active, and have two large, hollow jaws, by which they first catch their prey and then suck its blood. One of the smallest species, and one of the prettiest, has his antennæ enclosed in a kind of box with a hinged lid, which protects them from the water.

Jenny. I rather think I have seen them. Are they not of a bright-blue colour? and do they not go dancing and skipping about upon the water without appearing even to wet their feet?

Beetle. Yes; that is my cousin *Gyrinus* exactly. I cannot imagine how he does it, for my part. There is nothing of which I have so much dread as falling into the water among those frightful fishes with their sharp teeth. But *Gyrinus* does not seem to think or care any thing about that,—though I am sure hundreds of them must be devoured every year,—but, whenever he can find a sheltered piece of water and half a dozen companions to play with him, there you may find them from morning till night, week in and week out,

dancing round and round each other in never-ending circles.

Jenny. I have often watched them playing round on the brook. Are there any other water-beetles?

Beetle. Oh, yes, a great many. One very large one, almost as large as the stag-beetle, spins a silken bag for the reception of her eggs, which she leaves to swim round on the water until hatched. I am sorry to be obliged to add that the young beetle is by no means amiable or engaging in its manners: on the contrary, it is so savage and destructive in its habits that the French call it the assassin-worm. It swims with great ease and rapidity, and destroys every thing that comes in its way,—worms, small shell-fish and the larvæ of other insects; and it has even been known to attack minnows.

Jenny. Are not beetles very injurious to vegetation and fruit? I think I have heard so.

Beetle. Yes; I think it cannot be denied. There are some which, like myself, devour the roots of grain and grass, so that in some places

the turf may be rolled up like a piece of matting. Others devour turnips, beet-roots and cucumber-vines. I dare say you may have seen one of them,—a disagreeable-smelling, awkward creature called the squash-bug: though here let me say it is an error to apply the word “bug” to our family, as it properly belongs to quite another family of insects. Others bore holes in wood, and thus injure it very much, making it indeed quite unfit for use. Perhaps you may have heard your father mention the borers in the locust-trees?

Jenny. Yes; and I have seen the holes they made: they entirely destroyed a beautiful honey-locust before our parlour-window. The trunk was as full of holes as a colander.

Beetle. Those holes are the work of a beetle; and a very handsome and polite fellow he is. In the month of September you may see them, resplendent in black velvet and gold, running up and down the trunks of the locust-trees, stopping every now and then to bow politely to those they meet, saluting them with a curious, creaking noise. It is the larva or grub which does the mischief, by eating into the

heart of the tree. There are a good many of these wood-eating beetles, which do much mischief to trees and timber, sometimes even destroying whole forests. Have you never seen the plums and peaches lying on the ground under the tree, each one with a little crescent-shaped mark on one side?

Jenny. Yes: mother says the curculio stings them.

Beetle. The curculios belong to a curious family of beetles, who have a snout or bill often longer than their bodies. One kind lays its eggs in fruit and causes it to drop off; another pierces the pods of peas and deposits an egg in each pea. The little weevil eats out the inside of the pea, carefully avoiding any injury to the germ,—which, you know, is the part that sprouts,—and when he has completed his transformation he makes a hole and comes out.

Jenny. I have often seen peas with little holes in them and wondered what made them. Thank you, Mr. Beetle: I had no idea I should be so much interested in your family. I must go into the house now; but, if I can ever do any

thing to make a return for your stories, I shall be very glad.

Beetle. Not at all, Miss Jenny; I am very glad that I have been able to interest you. If, whenever you see a beetle lying upon its back, you will be kind enough to set it upon its legs again, I shall feel amply repaid for any pleasure I may have given you.

Beetles are abundant all over the United States, and, indeed, all over the world,—for there is no family of animals more widely diffused. The brown beetle, dor-beetle, or June-bug, annoys us in the spring and early summer by flying in our faces and around the lights as soon as the windows are opened. The great stag-beetle, pinehing-bug, or horn-bug, comes a little later, and is really a terrific-looking creature. He is not fond of using his weapons, but he is capable of giving a severe pinch with them, which sometimes leaves a lasting scar. Still later appear the spring-beetles or snapping-bugs, in great multitudes; and, as they are as fond of light as any of their brethren, they often prove a real annoyance in warm

summer evenings. But those which we see about the house are only a few out of the thousands which run, fly and jump about the open fields and woods.

It is, I believe, only in this country that the word "bug" is applied to all sorts of small insects,—espeeially beetles. In England it is only applied to bedbugs, and other disgusting insects of the same class; and even this use is eomparatively recent. I have seen an old translation of the Bible, in which the fifth verse of the ninety-first Psalm is rendered, "Thou shalt not be afraid of any *bugs* by night,"—bugs meaning terrors or dangers of any kind.

A beetle seems a eurious creature to pet; but M. Rosel, a French naturalist, once kept a number of rose-chafers for some time, feeding them with bread moistened with sweetened water, upon which they thrived very well.

Mr. Waterhouse, an Englishman, kept a stag-beetle in a cage for a long time. It became quite tame and playful, and would amuse itself by tossing and rolling about a ball of cotton with its jaws, and by pinehing the

finger of its master,—from which circumstance it appears that the pinching-powers of English beetles are not so well developed as those of their relatives in this country, or Mr. Waterhouse would hardly have consented to its diverting itself in this way. It was very fond of moist sugar and the juices of sweet fruits,—especially raspberries. It has been supposed that the larva of this beetle is the Cossus so much prized by the ancient Romans as a delicious morsel; others believe the Cossus to have been the larva of the great goat-moth,—a most ugly and ill-smelling caterpillar. The grub of the palm-weevil, which is very large and juicy, is eaten both in the East and West Indies, and is said to be very delicious. The beetle is mentioned in the Jewish law as among the insects which may be eaten; but the word so translated is supposed to denote the locust. The original word signifies a large class of insects of which the locust is one; and this was a well-known article of food.



Crested Locust. South America.

T. Sinclair's lith. Enslad

CHAPTER VII.

A MUSICAL FAMILY.

Cricket, (to himself.) WHAT a pleasant evening it is!—so cool and soft after the shower! Rain was really needed very much. I have not eaten a blade of grass for a week which did not taste as dry as straw two years old; but to-night I will not wish for any thing sweeter. I believe I will sit in the door of my house and play a little; and perhaps, if some one else of the family is about, we may get up a concert. The musical season has really come round again; but the weather has been so dry I think we have made much less noise than usual.

Pshaw, now! there is some one coming to spoil it all. These men are the plague of my life, with their great feet and heavy boots, as though they really had a right there. Oh, no!

it is only little Miss Jenny. I am not afraid of her.

Jenny. Good-evening, Mr. Cricket. Your voice sounds as finely as ever, I think.

Cricket. Why, yes, upon the whole, I believe I have not lost much from my long silence, though I find myself a little out of practice.

Jenny. Pray, do not stop singing. I heard you up at the house, and came down on purpose to enjoy your music. How far you can make yourself heard!

Cricket. Yes; I flatter myself that I do my share in our evening entertainments. But, strictly speaking, Miss Jenny, it is not correct to talk of a cricket or a grasshopper's singing. We have not musical voices, and are only instrumental performers.

Jenny. Indeed! I always imagined that you made your music with your mouths and throats, in the same way that birds do. I should be very glad to have you tell me something about your musical instruments, if you please.

Cricket. I shall do so with great pleasure, my dear. They are very simple in their con-

struction, and easily understood, consisting simply of my wing-cases, or elytra, as the beetles call them, which, you will observe, are divided lengthwise, by very strong nerves or branches, into two principal parts, one of which covers the side of my body, the other the back. These parts are divided again into numerous figures by smaller nerves, and in the space between them the membrane of which they are composed is tightly stretched, like the ends of a drum. When I rub these wing-cases together, a quick, trembling motion, or vibration, is communicated to them, which produces the music. Some grasshoppers use their legs in the same way, playing upon them like fiddles. But you must not suppose our instruments are all alike. Some of them are much more curious in their form and the manner of using them, though I do not think there are any which produce sweeter sounds.

Jenny. Nor I. I suppose your family is quite a large one?

Cricket. Oh, yes,—very large, and widely scattered; and nearly all the members of it have musical talents. By-the-by, I believe the

beetle tried to prejudice you against me, by telling you that the cockroach is related to us. Now, it is certainly true that the cockroaches are our cousins, as well-as those ferocious and hypocritical insects the mantes; but that is not our fault. We have nothing to do with them, nor they with us.

Jenny. Make yourself easy, Mr. Cricket. I have never thought the worse of you for your connection with those unpleasant creatures. But, please to tell me, is it really true that the cockroach will nibble people's fingers and toes?

Cricket. It has been said so upon very good authority, certainly, and I think it is very probable; for they are very voracious, and nothing comes amiss to them: woollen cloths, leather, bread, sugar and meat,—all suit their appetite, and one thing about as well as another. Some of them grow to an enormous size,—particularly in hot countries, where they abound to such a degree as to make old houses almost uninhabitable. In this country they very seldom fly, their wings not growing sufficiently large and powerful to support their heavy bodies; but they run with great rapidity,

and can carry off objects much larger than themselves, as I dare say you may have seen, —if you know any thing about them, that is; for, I am thankful to say, they are not often found in this country.

Jenny. Yes: when I was staying at my aunt's in R—— I saw a great many. They lived in an old house there, and, all aunt could do, she could not get rid of them. Every thing in the kitchen had to be covered up, or they were sure to be in it or on it; and they even came up stairs into the bedrooms. I remember, one night, the baby had left half a cracker on the floor in the nursery, and I was lying looking at it by the lamplight, when all at once it seemed to start and walk away of its own accord. I remember how nurse laughed when I cried out, "Oh, Sarah, the cracker is running away!" I soon found out what it was, and saw plenty of them afterwards. Finally, some one told my aunt to put red wafers round their holes and the places where they showed themselves.

Cricket. And did that drive them away?

Jenny. Yes: after two or three times they

all disappeared, and she had no more trouble with them. She was very glad, for they made every thing so dirty. I don't know what would have become of us if they could fly as well as run.

Cricket. I presume you would get used to them, as people do to almost every thing, after a while; though it must be very disagreeable never to be able to light a candle without being surrounded by hundreds of these plagues. The great South American coekroach, among his other good qualities, has the faculty of making a pretty loud knocking, like a person tapping with his knuckles upon a board; and when there are three or four answering each other at once it is said to make sleep quite impossible.

Jenny. I am glad we do not have them in this country. But I would like to hear something about the rest of your family. Which of them is it that sings under the kitchen-hearth all the year round so merrily?

Cricket. That is the house-cricket. He is a very sociable little fellow, and loves the heat of the kitchen-fire as well as I do that of the

August sun. But how does Agatha like to have him there?

Jenny. Oh, she does not mind. She is such a good-natured girl nothing troubles her. She likes to hear them sing, too; and I believe she thinks it is lucky, as she says, to have a cricket on the hearth. But she says he will eat her wet woollen stockings if she is not careful to put them out of reach. Is that true?

Cricket. It cannot be denied that he plays such pranks sometimes; but I believe it is only when he is very thirsty and cannot obtain water in any other way. There are many other kinds of food which he likes much better than wool.

Jenny. Such as what?

Cricket. Such as the sweepings of the pantry, crumbs of bread, sugar, and especially apple-parings and bits of sweetmeat. He is very fond of milk, too, and often tumbles into the pitcher in his eagerness to obtain a drink. He does not do much mischief, however, and is very neat in his habits; so he is not very often interfered with. I have no objection to a bit of fruit myself, for a change; but I usually

eat salads myself,—nice fresh grass or chick-weed cleaned with dew or rain-drops; for I am as thirsty as my cousin, and should soon die if I could not have water.

Jenny. How have you managed for the last two weeks? There has been no rain for so long that the meadows really began to look brown and dry.

Cricket. I have suffered a good deal; but still we are very kindly taken care of, for you will observe that when there is no rain we usually have very heavy dews; and, by making my meals early in the morning or late at night, I have managed to keep alive. The rain yesterday, however, has drenched every thing so thoroughly that I think there will be no more suffering for some time to come.

Jenny. Do the grasshoppers like to drink as well as yourself?

Cricket. Yes: we are all much the same in that respect. Grasshoppers are very neat in their habits, too, and you may often see them dressing and cleaning their bodies with their fore-claws.

Jenny. I think some of them are very

pretty, especially the little green ones with long horns,—antennæ, I mean,—and the large winged ones, which are almost as handsome as butterflies. The large green and brown ones are very amusing, too; but they are the most hasty, inconsiderate creatures: they never seem to think, when they jump, where they are likely to land. I have seen them come plump down into the middle of a great spider's web. It was hard to tell which was the most alarmed, the cricket or the spider; and no longer ago than last night, as Fanny and I were sailing chips in the brook, two of them plunged down right into the water. We got out one of them, but a fish caught the other before we had time to save him.

Cricket. It is true they have not much consideration; and, indeed, I think all our family are deficient in that respect. We are never apt to look before we leap, and as long as we are out of trouble we do not consider whether we are likely to get in.

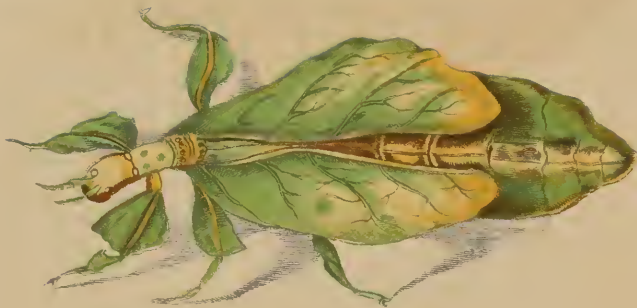
Jenny. How do grasshoppers lay their eggs?

Cricket. In the ground, usually; and in most varieties the female is furnished with a sword-

shaped weapon for the special purpose of digging a hole for them. Grasshoppers undergo the same metamorphosis as other insects; but the larva, the pupa, and the perfect insect are all so much alike that unless you observed them very closely you could not tell the difference. We have no inactive state, like the beetles and butterflies, and, I believe, some people think we do not enter the pupa state at all. I am sure no cricket would be willing to remain done up like a bundle for six or eight months, like the caterpillars,—no, not even the mole-crickets, which spend most of their time under ground.

Jenny. Mole-crickets! What are they? I do not think I ever heard of them.

Cricket. They are not much known, as their habits keep them out of sight and they are not very noisy. They are the largest of the cricket-kind, however, being fully an inch and a quarter in length, and are furnished with a pair of very large and strong fore-claws, with which they dig their burrows. These burrows are usually formed in damp meadows or by the side of streams and canals, and consist of a long curved passage, ending in an arched



Phyllium siccifolia.
Walking Leaf

T. Sinclair's lith, Philad^a.

chamber, which oftens contains two or three hundred eggs. The mole-crickets make very little trouble in this country; but I understand they are considered mischievous creatures in England, as they gnaw and destroy the roots of plants. It has been said that the mole-cricket shines at night, like the fire-fly; but I have never seen one, and I think it is very doubtful.

Jenny. You spoke of the mantes. What are they? Do they live in this country?

Cricket. No; they are inhabitants of very hot countries, such as South America and Africa. Some of them are very curious creatures, and so closely resemble a leaf, or a bunch of leaves and stems, that you could hardly tell the difference unless you saw them move. They, however, are very harmless creatures, and interfere with no one.

Jenny. I have seen something like that upon the bushes in our pasture,—only the one I saw looked not like a leaf, but like a small, slender branch, with twigs growing out of the sides. Its head looked like a bud, and there were other smaller buds where the legs came out. 1

could hardly think it was alive till I saw it move, and then it walked off pretty briskly. Is that an insect of the same kind?

Cricket. Yes; it belongs to the same class of orthopterous insects,—the walkers, or spectres, as they are sometimes called. If you were to put him upon a piece of cloth, he would stick so fast with his little, sharp claws that you could hardly pull him off. He is harmless, however, and very pretty. But the mantes in general, though very graceful and elegant in their structure, are far from amiable in their manners. This is especially the case with the one called the praying mantis.

Jenny. What a singular name!

Cricket. It is so called from the position it assumes when waiting for its prey. It holds its head and neck erect, and draws its fore-legs, which are very long and strong, up to its face in the attitude of prayer, and so it will sit for hours. You would think it one of the best insects in the world, to see it; but woe to the unlucky fly that trusts to its apparent harmlessness and alights near it! The mantis crawls along towards it, with a motion as slow as that of the hour-hand

of a clock, till it has reached a convenient distance from its intended victim, when the cruel claws are thrust forward with the quickness of lightning, and the poor fly is hooked up, to be torn to pieces and devoured at leisure. This done, the mantis cleans itself all over, takes a few turns for exercise or pleasure, and then composes itself to wait for another victim. Whenever two mantes meet there is certain to be a battle. They remain motionless for a few minutes, with their great green eyes (each with a blood-red pupil) fixed upon each other. Then their wings and bodies begin to quiver and flutter, and, as though at a given signal, they rush upon each other, cutting and striking with their strong, sword-like claws, like two furious troopers, till one or the other is killed. Savage and cruel as they are, however, they are very cowardly; and half a dozen little ants will put a whole company of them to flight.

Jenny. What ugly, disagreeable creatures!

Cricket The female mantis has a singular way of disposing of her eggs, which she arranges in two rows in an orange-coloured bag made of a substance like fine, soft parchment.

As soon as the little mantes are hatched, they eat their way out of this bag and scamper off, soon to become as mischievous and cruel as their parents. Should a party of ants come along as they are making their way into the world, their career is cut short very suddenly, and, instead of making meat of others, they are speedily made meat of themselves by these determined and active little insects. It is singular that, in spite of its ferocious and treacherous habits, the mantis is looked upon as an omen of prosperity in the countries where it is found, and a South African wishes for nothing better than for one to alight on his sleeve. It is also said that, if a child lost in the woods finds a mantis, the benevolent insect stretches out one of its claws to show him the way home, and never fails to give the right direction.

Jenny. But that cannot be true, really?

Cricket. No,—no more than it is true that “old father long-legs” (as he is called) will show you where the cows are if you ask him. It is only a superstition. But there is another member of our family much more to be

dreaded than the mantis, which, after all, hurts nobody but the insects it feeds upon. I mean the locust.

Jenny. What! do they belong to your family too? I have heard something of them. They do a great deal of mischief, do they not?

Cricket. Oh, yes, indeed,—much more than all the grasshoppers and caterpillars in America put together.

Jenny. I should like very much to hear about them.

Cricket. The locusts at their first appearance look something like dull, sluggish grasshoppers. They are hatched early in June, and at first you would think them very harmless, insignificant insects; but presently they begin to assemble themselves in square compact masses, like an army on the march. These battalions are often several hundred yards square. They then begin their progress over the country, and from henceforth nothing can stop them. Every one goes straight forward, without turning to the right or left, and eats all before him, whether it be grain, grass, weeds, or trees. Nothing in the shape of green vegetation comes

amiss to them; and a field which they have overrun looks as if a fire had passed over it. "The land is as the garden of Eden before them, and behind them it is as a desolate wilderness." Should a building of any sort come in their way, they climb over it and pursue their journey all the same. It is said that the champing of their strong jaws may be heard a quarter of a mile off.

Jenny. But can nothing be done to stop them? I would build great fires and make ditches full of water in their way.

Cricket. All these plans, and many more, are tried, and sometimes they succeed in some measure in stopping their progress; but more often the countless multitudes succeeding each other soon put out the fires and fill up the ditches, and the miserable people can do little but stand by and see their harvests destroyed without hope of a remedy. They continue in this first or larva state about a month. When the time for their change comes, they may be found fastened to a bush or tree, or some other object, and twisting about their bodies like caterpillars about to change their skins.

In a few moments the skin opens, the head of the locust emerges, and finally the perfect insect appears. It is now very handsome, with fine gauzy wings of a greenish-brown colour, beautifully variegated with spots, which sometimes take the shape of letters, in which the Arabs think they can read a prophecy of what is to befall their nation. The thighs of their hind-legs are thickened like those of grasshoppers, and they can leap to a considerable distance; but their broad sails are now their principal means of locomotion, and enable them to take long flights,—even across the sea.

Jenny. I hope their manners are improved as well as their looks.

Cricket. I cannot say much for them in this respect. They are as greedy and destructive as ever; and, as their powerful wings enable them to extend their travels, they are even more to be dreaded than before. They have oftentimes caused dreadful famines in the countries they infest, so that many thousand persons have died of starvation. It is fortunate that in this last state they do not live a great while. After eating for a few weeks,

they lay their eggs in the ground, and then grow feeble and die. Sometimes a great wind will rise and blow them all into the sea; and it has happened that the stench from their corrupting bodies cast up on the beach has bred a pestilence. Cranes, storks and many other birds catch a great many; and in Barbary and some parts of Asia large quantities are consumed for food; but the numbers do not seem to diminish.

Jenny. For food! Is it possible that people eat them? .

Cricket. They are eaten in many places, and considered very good. There are several ways of preparing them. One is to salt them down in large heaps, when they are eaten without further preparation; others parch them in iron pans over the fire till the legs and wings fall off; and in Palestine the people boil them in oil.

Jenny. Now you mention Palestine, I remember that John the Baptist ate locusts and wild honey in the desert; but I did not think of their being insects. I am glad they are of some little use in return for all the mis-

chief they do; but I do not like the idea of eating them very well.

Cricket. There is no accounting for tastes, Miss Jenny. I like only fresh herbs; my cousin *Domestica* eats crumbs of bread and cheese; and I have often heard him tell of the queer things that are cooked in the kitchen, such as fishes and pieces of animals, and even whole chickens and turkeys. Now, I do not see, for my part, why a locust, which eats nothing but clean vegetables, should not make as nice a dinner as chickens, which are always eating every thing they can lay their bills on, and, above all, those dirty, disagreeable pigs, which lie in the dirt from morning till night, and will even devour frogs and rattlesnakes!

Jenny. Ah, well, they may be very good, but I have no desire to taste them. Are there any locusts in this country?

Cricket. Yes, several varieties; and sometimes they have been numerous enough to do a great deal of mischief. The insect which you call the flying grasshopper is in reality a locust; but he is a harmless, good-natured fellow, very proud of his fine wings, which make him look

very much like a butterfly. The small red-legged locust sometimes does a good deal of mischief, particularly in the salt marshes, where they destroy and spoil a good deal of hay. Their ravages do not usually last long, and are commonly confined to a small extent of country.

Jenny. I remember hearing that when the people first went to Utah they were very much troubled with grasshoppers: perhaps they were locusts.

Cricket. I should think it likely: they are often mistaken the one for the other.

Jenny. Does that locust which is singing away so merrily in the elm, as though he would never tire, belong to the same family?

Cricket. No; he is not a locust at all, but belongs to an entirely different tribe of insects,—the Homoptera, as your learned people call them,—though there are some things about them which resemble a grasshopper. The chief distinctions are in the wings, which are of the same substance throughout, and, when folded, cover the body like the roof of a house; and in the mouth, which is formed with a tube for suction instead of jaws for chewing. The

tongue is lengthened out and hollowed into a tube, and around it are placed some very fine lancets for piercing the bark of trees, from which it extracts the juices.

Jenny. They seem to be a musical family as well as your own.

Cricket. Yes; we often take parts together in our summer-evening concerts, though the cicada usually prefers to sing in the hottest part of the day. His musical instruments are much more curious and complicated in their structure than our's, but I must say I do not think their tones are any finer.

Jenny. No, indeed; I do not like them half so well: and, besides, they never know when to leave off. When one of them begins his chee-chee-chee, I always think he never means to stop; and he ends at last with such a provoking little squall. No; I do not like them half so well as the crickets.

Cricket. They do very well now and then, if there are not too many of them,—though, as you say, they are rather too fond of their own voices. But, if you call the cicada noisy, what do you think of the Katy-dids?

Jenny. Oh, they are such funny little creatures! I love to hear them. They seem never weary of contradicting each other. The other night there was one in the plum-tree by my window, and one on a rose-bush close by, and they kept up the contest all night, I should think, for I heard them whenever I was awake. The one in the plum-tree began by saying, very slowly and solemnly, "*Katy did.*" Before the words were fairly out of his mouth, if one may say so, the other replied, with the same solemnity, "*Katy didn't.*" "*She did,*" said the first; "*She didn't,*" said the other: and so they went on, till they were too tired to say any thing but "*did,*" "*didn't.*" Then they would take a rest and begin again. Pray, Mr. Cricket, do you know what it was that Katy did or didn't do? I have often wanted to know.

Cricket. I believe no one has ever found out, for they will never tell; and I have sometimes fancied that they know no more about it than any one else. I suspect they dispute more from the pleasure of hearing themselves talk than any thing else. The Katy-dids are

neither locusts nor cicadas, but true grasshoppers; and we are all very fond of them, for they are pretty little things and very pleasant and amiable, notwithstanding their contentious manner of talking.

Jenny. I have heard Thompson talk of the seventeen-years locust; and he said yesterday that it was almost time for them to come again. Can you tell me any thing about them?

Cricket. Why, not much. They keep themselves so very much secluded during their larva state, and die so soon after they come out, that their family history is rather obscure. It hardly seems worth while to live seventeen years in the dark underground to spend only six weeks in the sunshine and fresh air.

Jenny. Perhaps they enjoy their larva state as much as the other. But do they usually live in the ground seventeen years?

Cricket. Oh, yes! there is no doubt at all of that. About the last of May or the first of June, you may see them beginning to come out of their holes in the ground in great multitudes, so that the earth in some places will be as full of holes as a honey-comb. They first

appear under the form of a wingless insect with six legs, the first pair of which is very strong and formed for digging; but if you look closely you may see the wings under the transparent covering. As soon as one of them is out of the ground he seeks some bush or tree, to which he firmly attaches himself. Presently the outer covering splits open down the back, and the perfect insect creeps out. It remains motionless a little while to dry its wings, and then flies to the nearest tree and sets up its noisy song, which may be heard fully a mile off. The females begin to lay almost immediately. They are furnished with a very nice and curious apparatus of saws and files, with which they bore a hole in the under-side of a branch and there deposit their eggs. As soon as the eggs are hatched, the young one, which exactly resembles the old locust before its transformation, falls to the ground, and immediately digs his way into it, and nothing more is seen or heard of him till the seventeen years are passed again.

Jenny. How very curious! I wonder where they stay, and what they live on.

Cricket. I believe little or nothing is known on the subject. It seems as though they must go very deep, for they are seldom found, though I have heard of their being dug up in making wells. Some people say, however, that they never go far from the top of the ground, but subsist upon the roots of plants. Though when they first make their appearance they are so fat that they are sometimes made into soap, yet by the time of their death they are diminished to mere shells. Indeed, they take very little food in the perfect state, and spend their time principally in singing and amusing themselves.

Jenny. Well, Mr. Cricket, I am very much obliged to you for the pretty stories you have told me, as well as for the merry songs you sing every night in the meadow. I hope nothing will happen to disturb or annoy you in your little house, and that you will continue to sing till cold weather comes. By-the-by, what will you do then?

Cricket. I shall shut up the door of my house and go to sleep for the winter, and so come out fresh and merry in the spring.

Jenny. Then you do not lay up any provisions?

Cricket. No. Why should I? I cannot eat while I am sleeping, and I never open my door till the grass has sprouted. No: I am spared all that trouble, and really, upon the whole, I think crickets and grasshoppers are as well off as any insects in the world.

Jenny. I am glad to see you so contented. But, honestly, Mr. Cricket, would you not like to have something else,—wings like the moth, for instance, so that you could fly in the air?

Cricket. No, Miss Jenny; I have no such desires. I do suppose that the good and wise Creator—who made crickets in the first place—knew how to provide for all their wants better than you or I could do. He has given beautiful wings to the butterflies and moths and to my cousins the locusts, and no doubt he would have provided me with them had he seen best; but, since he has not, I am quite content without them.

Jenny. You are much wiser than I was the other day, Mr. Cricket. My cousin Mary

Stephens came to see me, and she looked so beautiful that I could not help comparing myself to her and wishing I could be as handsome as she is, and I made myself so unhappy about it that I was downright cross. But the next time I am tempted to be so foolish I will remember what you have said and try to be a better and a wiser girl. Good-night.

Almost every child has heard of the destructions caused by locusts. Both in ancient and modern times they have been dreaded as one of the scourges of the human race, and the lion and tiger are not half so much feared, in the countries where they are found, as these apparently insignificant insects. The first we hear of the locust is in the tenth chapter of Exodus, where it is mentioned among the plagues which the obstinacy of Pharaoh brought upon the land of Egypt. After that we find it spoken of both in the Old and New Testament. Locusts are enumerated in the law among the allowable articles of food; and some people have supposed that they were the quails which were supplied to the children of Israel in the wilder-

ness. In the second chapter of the prophecy of Joel is a wonderfully graphic account of the march of the locust.

This creature has been no less dreaded in modern times. Palestine,—and, indeed, the whole of Asia Minor,—the Greek Islands, and the whole of Africa, are subject to their inroads. They have never been so destructive in Europe, though Hungary and Transylvania have several times been overrun with them, and in the year 1728 they extended their ravages into Poland, destroying trees, grass, and every thing in the shape of cultivated crops, but for the most part sparing the vineyards. About Warsaw they lay knee-deep upon the ground, and travellers on horseback were actually stopped by them. “A fearful sound accompanied them, like the rushing of a stormy wind. The sky was darkened, and we could not see ten paces before us. The sky never poured down snow so thickly as it teemed with locusts.” A part of the same swarm appeared in England, and was seen in London as a thick black cloud upon the horizon. The trees in some counties were stripped of their foliage, and many of the

common people were much terrified, supposing that the appearance of these insects was an omen of the end of the world. I remember, when I was quite a child, hearing the same thing said of the seventeen-years locusts, which appeared in our neighbourhood in countless numbers about that time.

In Barbary they frequently appear in countless numbers and destroy all before them, in spite of every thing that can be done to check their progress. The Moors, however, make themselves some amends by catching great quantities of their enemies and converting them into food by the different processes of roasting, boiling in oil and frying in butter; and, thus prepared, they are said to furnish a very nourishing and agreeable article of diet. They laugh at the Christians for refusing to eat them, and remind them of their fondness for lobsters and oysters; and really there seems no good reason why a locust should not be as good to eat as a crab. It certainly is a good thing if the poor people can make any use of them.

It has been said that there are no domestic

crickets in America, and that the field-cricket only enters the house by accident ; but I have both seen them and heard their merry music around the corners of old-fashioned fireplaces, and even about a cooking-stove. Many people dislike them very much, and take great pains to drive them away with snuff or camphor ; but there always seems to me something very pleasant and home-like about the sound, if there is not too much of it. They are apt, it must be confessed, to be rather troublesome, gnawing yarn and other woollen things, and falling into milk-pans and pitchers in their eagerness to obtain a drink. The fall-cricket usually begins his song with us about the middle of August, making the air ring all night with his shrill notes, which seem to have the effect of a loud noise at a great distance. There are several varieties of them, one of which makes a noise exactly like a miniature stocking-loom. Crickets are very pugnacious creatures ; and the Chinese keep them in cages, and amuse themselves by setting them to fighting and making large bets on their respective powers.

There are many varieties of grasshoppers

in this country, but they are seldom numerous enough to do any great harm. They are very lively and amusing, and an observation of their habits adds much to the pleasure of a walk in the fields.

CHAPTER VIII.

HUNTERS AND MINERS.

Dragon-Fly. I UNDERSTAND, Miss Jenny, that you have lately been holding conversations with a great variety of insects, who have told you all sorts of wonderful tales about themselves and their relatives, and that even the poor, cowardly caterpillar, who cannot help himself if a contemptible little ichneumon fly comes after him, has had his say about his gluttonous, lazy family. I cannot imagine what pleasure you find in their society, for my part.

Now, there is the wasp, really worthy of some respect, considering his size and his relative the hornet; and even the bees might be somebody, if they did not spend all their time over their miserable wax and honey, toiling like slaves from morning till night, only to be

robbed of the fruits of their labour at last. But if you really want to see a handsome insect—one really worth looking at and talking to—just look at me! Where will you find such wings as mine,—so long and strong, and reflecting all the colours of the rainbow? Who has such a long, graceful body and tail? Eh?

Jenny. No doubt you are a very beautiful creature, Mr. Dragon-Fly,—though I have heard it said that “self-praise goes but little ways.”

Dragon-Fly. You may call me *Captain* Dragon-Fly, and not *Mr.*, if you please, Miss Jenny. I was born and brought up on the water, in a vessel of my own, and never left it till about two weeks ago. And then, if you are fond of hard work and hard workers, (I confess I am not partial to either,) where will you find such industrious builders and miners as in my family? Talk of the ants and their boasted edifices: why, their hills are no more to be set alongside of the palaces of my cousins, the termites, than Fanny’s playhouse is to be compared to St. Paul’s Church. And the spider, too: very grand she is about her nets and snares, as though she ever did any

thing to compare with the ingenious traps of my French relative *Formica leo*. Traps and snares are a slow way of doing the thing, at best; but if I were going to set a trap I would make one worth while.

Jenny. I should be very glad to hear of some of those wonderful things, Captain Dragon-Fly; but I do not see why you should abuse all the other insects at the same time that you praise yourself. There is plenty of room in the world for them and for you too.

Dragon-Fly. Yes, and for me to catch them in, too, just as I am going to do to that long-legged crane-fly. (*He dashes after the crane-fly, but misses it.*) Pshaw! how stupid! My right upper wing has been a little stiff for two or three days. But I don't think much of the crane-flies. They are all legs and wings,—very little substance to them; and I am not hungry, either. That last butterfly was so fat he will last me for some time. Well, Miss Jenny, I am ready to answer any questions you may please to ask,—especially as you do not clap your hands to your ears and run away screaming, as some of the school-child-

dren do. Why do they act in that senseless manner?

Jenny. I presume some one has made them think that you will fly through their ears if they do not cover them up. I know a woman told me so once, and I was very much frightened, till mother showed me that you could not possibly do any such thing. But I was a very little girl then, and knew no better than to believe every thing that people told me.

Dragon-Fly. That is the reason why some people are so foolish and thoughtless as to call me a devil's darning-needle, is it?

Jenny. Yes, I presume so.

Dragon-Fly. They must be idiots, I think. What in the world do they imagine that I want to fly into their ears for? They do not have insects in their ears, I presume; and that is all I care for.

Jenny. But what did you mean by saying that you were born and brought up on the water?

Dragon-Fly. Just what I say. My mother—who, I presume, was a fly of remarkable ingenuity and talent, though I never saw her—laid

her eggs in the water, where they floated about, looking something like a bunch of small white currants, till they were hatched out into small, active larvæ, each one furnished with a strong and sound set of teeth and a handsome mask to conceal them, and each one perfectly capable of taking care of itself. All these larvæ immediately parted company, each one swimming about freely by means of a curious apparatus inside his body, till he found a place which suited him, when he sunk to the bottom of the water, and, covering himself with a cloak of whatever he could lay his hands on, such as bits of leaf or grass, small chips of wood, shells, and so forth, waited for his prey to come along, —which it did very soon, in my case, in the shape of a fat little water-skipper; and very proud I felt when I had caught him.

Jenny. But what is this swimming-apparatus you speak of? Is it any thing like the fins of fishes or the hairy legs of the water-beetles?

Dragon-Fly. No, not in the least. I swim by means of my lungs.

Jenny. Excuse me, Mr.—I mean Captain—

Dragon-Fly, but I do not see how that can be possible. I presume your lungs were not on the outside of your body; and I never heard that lungs were of any use except to breathe with.

Dragon-Fly. As to presuming that my lungs could not be on the outside of my body, that only shows your ignorance, if you will allow me to say so. The larvæ of the May-flies have their lungs entirely upon the outside. Very good eating are those May-flies in all stages of their existence,—only such harmless, short-lived little things that one is almost ashamed to kill them. But that is neither here nor there, as the saying is. The simple truth is that my lungs do—or rather did—serve me both for swimming and breathing; and I will try and explain the matter to you if you will listen quietly and not interrupt me, for that is what I dislike very much. You have seen those little squirt-guns that the boys make out of elder, with a piston to draw up the water? I cannot bear boys: they are always in mischief. But you have seen these guns, have you?

Jenny. Yes, often; and Thompson has a garden-syringe, which he uses—

Dragon-Fly. Never mind how he uses it : if you have seen it, that is enough. Well, my body in the larva state constituted just such a squirt-gun or syringe, of which my lungs formed the piston. Every time I breathed,—for I suppose you know that fish and water-insects breathe water just as you breathe air,—every time I drew a breath, I say, my lungs ascended towards my head, and left a vacant space in my body, into which the water rushed through holes provided for the purpose. The next instant it was forcibly driven out again by the descent of the lungs to their former place, and the jets of water, issuing from the holes and striking against the other water, drove my body along with considerable swiftness.

Jenny. I see. But could you swim in any direction you pleased ?

Dragon-Fly. Of course I could, by merely turning my tail in a direction opposite to that in which I wanted to go. Well, I lived at the bottom of the pasture-spring in this state for about a year, and had on the whole a very

nice time, never wanting for game, and having plenty of fresh water. I had one or two very narrow escapes, being once attacked by a furious water-spider; but I made her know that she had better let me alone. Then a small fish, which had somehow got into the spring, committed great ravages among its inhabitants, and once was very near seizing me; but I escaped by diving under a stone and keeping pretty quiet till he got tired of watching for me. I heard afterwards that he got swallowed himself by a white duck who used to come there sometimes. Well, about the end of the year I began to grow very discontented, and to feel as though I had lived in the water long enough. I saw some very elegant-looking creatures, with long wings and bright eyes, flitting over the surface of the spring; and I felt perfectly certain that I could fly just as well as they did if I could only get rid of that stupid skin which was already growing too tight for me. So one fine spring morning I crawled, with considerable pains and trouble, out of the water, and climbed up the stalk of a rush which grew near, to which I fastened myself by my claws. I had not much time to

think where I was, or how curious it seemed to be out of the water and so high above it, when I felt a sudden, sharp pain in my back; and, looking to discover the cause, I found that my skin had split in two, right across my shoulders. "Oh," thought I, "if that is the way it is going to be, I may as well have it over at once." So I swelled out my head and body as much as I could, and in a moment the crack ran across from eye to eye, the parts separated, and I found I could almost creep out of them. Still my wings were very soft and liable to injury; my claws were entangled in their old boots, and I found it was going to be rather hard work to get them out. By taking time and pains, however, it was accomplished safely. I crept by degrees out of my old case, and, bending my body so that it need not prevent the proper expansion of my new wings, I sat down quietly to rest and to recover myself after so great a change.

I must say, I almost wished myself back in the spring. I thought, as I looked around me from the top of the rush, that the world was a much larger place than I had ever had any

idea of; and I could not help feeling some misgivings as to whether I should be able to get a living in it.

Jenny. It must have seemed strange enough, —strange as it did to us when father took us out on the lake in the steamboat. I was almost frightened when we got so far that we could not see the place we started from, and only a faint blue line before us. But go on with your story, if you please. How long did it take your wings to dry?

Dragon-Fly. Why, I was rather unfortunate in the choice of a day. The morning was damp and cloudy, and it was all of two hours before I found myself able to rise into the air. I have since seen dragon-flies who could fly famously in a quarter of the time. But it was a grand moment when I first ventured to leave the friendly rush and take a flight over the surface of the water in which I had lived so long. Here I saw a number of dragon-flies, some exactly like myself, others with wings barred with brown, and still others with slender blue bodies that shone in the sun as brightly as the water itself. I re-

mained here a day or two, and then concluded to seek some place where game was more plentiful and hunters not quite so numerous. So I set out in company with one of the small blue ones, and we explored the brook leading from the spring, hunting as we went, till we reached the river, where I now spend most of the time, except when I take a short inland excursion, like the present, to look for moths and butterflies.

Jenny. How splendid your wings are! They actually flash as you wheel about in the sun. You seem to fly just as well one way as the other,—backward, forward, or sideways, it is all the same. Do you never fold them up?

Dragon-Fly. No, never. When I desire to rest a moment,—which I very seldom do, for I hardly know what it is to be tired,—they lie flat and expanded as you see them now, and that is the reason I can take flight so suddenly. Observe, if you please, what a beautiful lace-work is formed by the veins, and how transparent and pure the membrane is between them.

Jenny. I think, after all, your eyes are the

most beautiful things about you: they are so large, and flash like jewels in the sun. I suppose you can see very well with them?

Dragon-Fly. Why, yes,—considering that I have only fifty thousand eyes, I manage to steer my way with tolerable exactness.

Jenny. Fifty thousand eyes! Now, Captain Dragon-Fly, you really are making fun of me this time. No insect ever had so many as that.

Dragon-Fly. I am telling you the simple truth, Miss Jenny, when I say so. Each of those large brilliant globes upon my head is composed of twenty-five thousand small eyes, each of which sees straight before it, and by means of which—being, as you see, extremely prominent—I can discover objects before, behind and on each side of me. Why, the common house-fly has almost as many as that.

Jenny. I thought it was very wonderful when my friend Mrs. Spider said she had eight eyes; but that is nothing to this. It is more wonderful than any thing I ever read in a fairy-tale.

Dragon-Fly. There are more wonderful things in nature, my child, than ever were

put into any fairy-book; and the more you study the construction and habits of animals the more you will find this to be true.

Jenny. And that reminds me that you promised to tell me something about some cousins of your's who were great builders. You said the ants could not be compared to them.

Dragon-Fly. Neither can they. I referred to the termites,—or white ants, as they are improperly called.

Jenny. Why improperly?

Dragon-Fly. Because they are not ants, nor in any way related to them; and, in fact, the ants destroy them without mercy whenever they come across them. They live in Africa and India, and latterly a colony of them have established themselves in France, near Bordeaux, where I understand they have altered their manner of life a good deal.

Jenny. I shall be very glad to hear of them; for there is nothing that pleases me so much as to listen to stories about such creatures and to watch their motions.

Dragon-Fly. That shows you to be a sensible child. I have seen a great girl run and

scream as if a giant were after her, just because a poor, harmless, lumbering beetle flew in her face. But, to begin with the white ants. The first that is seen of them, they come abroad in great numbers about the latter end of the dry season; for, you know, in those hot countries the seasons are not like our's, but are divided into the hot, the rainy and the cold.

Jenny. Yes; I learned that in the Geography. But go on, Captain Dragon-Fly.

Dragon-Fly. The morning after the first shower, the males and females, who are furnished with wings much like mine, appear in countless multitudes. But they are poor helpless creatures, with soft, tender bodies, and their wings only last a little while, so that after the sun has been up a few hours you can hardly find one that has the full number. They are beset on every side by enemies, especially by ants, who hunt for them with the greatest energy, so that not one in a thousand survives through the day. It does chance, however, that one or two pairs escape, and, being found by some of the workers, who are continually prowling about their covered ways, they are imme-

diately elected king and queen of a new community by their new friends, who at once go to work to secure them from their foes and provide them a suitable habitation.

Jenny. That is like the ants. They have a queen and labourers, too.

Dragon-Fly. Yes; but their's are different from these. The population of a termite community is divided into several classes: first, the king and queen, who never do any work, but have many servants devoted to them, who feed and attend them and watch over their safety; next, the workers, which are the larvæ of the perfect insects, which do all the work and take care of the young till they are able to shift for themselves; then pupæ, which are as active as the workers, and can hardly be distinguished from them except by their wings, which just begin to show themselves; and, lastly, soldiers, which are something like the neuters in a common ant-hill. These last have very large heads, armed with powerful jaws, and their work is the defence of the community. No sooner have the workers elected a king and queen than they proceed to make a

chamber for the royal pair, which they never leave afterwards, though it is enlarged from time to time to suit the necessities of their growth. This regal chamber is always in the centre of the building, and there are constantly hundreds of labourers and soldiers waiting in the ante-rooms. No sooner is the queen enclosed than her body begins to enlarge in size, till sometimes it becomes as much as three inches long,—that is, longer than I am from head to tail.

Jenny. How large are the common termites?

Dragon-Fly. Oh, very small; not larger than that black ant crawling on the path. As soon as this enlargement takes place she begins to lay her eggs, which are immediately carried away by her attendants and bestowed in the nurseries, which are entirely different from the other apartments, being composed of raspings of wood glued together, with little chambers between them.

Jenny. What are the other rooms composed of?

Dragon-Fly. Of clay, finely tempered and worked by the feet and jaws of the labourers

Each hill consists of two distinct parts,—the exterior dome and the interior apartments. The first appearance above ground is in the shape of a little pyramid about a foot high. Gradually others arise by the side of it, while the centre one continues to grow, always keeping the largest, till their underground works are quite covered by them. The spaces between are then filled up, and the whole covered by a dome, which is so firm and solid that, I am told, the wild bulls of that country mount upon them while they keep watch over the herd below!

Jenny. Do cattle keep sentinels to tell them when danger is coming? I did not know that.

Dragon-Fly. It does seem very singular; but one often finds more sense than one expects in those great clumsy creatures. You must understand that this dome, which is more than ten feet high, or as large as a large haystack, is only the exterior covering of the building, and serves to protect the habitable parts not only from violence, but from cold draughts and heavy rains, either of which would prove fatal to the royal family and the young ones. The

royal chamber, which is occupied by the king and queen alone, is placed upon a level with the surface of the ground. It is composed of clay carefully smoothed and prepared, and the interior is shaped like a brick oven. At first it is not more than an inch in length; but as the queen increases in size it is enlarged to about eight inches. It has several doors,—which, however, are only large enough to admit of the passage of a labourer or soldier, as their majesties are prisoners for life.

Jenny. I do not envy these imperial ants, I must say, Captain Dragon-Fly. They must have very dull times shut up in their little clay oven and never leaving it.

Dragon-Fly. I think, myself, it must be a terrible life; and, if I must be a termite at all, I would rather be a soldier. Well, as I was saying, this royal cell is surrounded by numberless others, of all shapes and sizes, but all carefully arched and neatly furnished. These communicate with each other by numerous passages, and serve as waiting-rooms for the attendants, and also as barracks and guard-rooms for the soldiers, a great number of whom are

always on duty. Next to these are the magazines, containing their provisions,—and a famous stock of them, too,—consisting chiefly of gums and sugary particles which they get from trees. Intermixed with the magazines are the nurseries, which, as I observed before, are made of raspings of wood closely cemented together.

Jenny. What a wonderful piece of work! I really think my friends the ants must own themselves beaten,—though they are pretty ingenious, too, and very industrious, especially in repairing their houses.

Dragon-Fly. But your friends the ants never made any thing like the great covered galleries of the termites, which are sometimes thirteen inches high and extend hundreds of yards under ground, nor like their exactly-arched bridges, which are thrown from one part of the hill to another to shorten the communication.

Jenny. But what is the use of these great covered passages?

Dragon-Fly. To protect them, in their excursions after food, from their great enemies the ants, who are always prowling about after

them, and whose hard armour gives the soft-bodied termites little chance for their lives. They carry these passages wherever they go, so that they intersect the country in every direction. If they are obliged to seek the top of the ground, they construct a covered way upon the surface, which they carry over rocks, trees, or whatever may be in their path; and it is curious that wherever it is possible they make a covered way exactly parallel to it, so that at the least alarm they can sink from one to the other and thus be entirely out of danger.

Jenny. But suppose the nest itself is attacked: what will they do then? I suppose they will all sink under the ground and run away in their arched passages as fast as possible.

Dragon-Fly. No, indeed,—not they! They show a temper worthy of the courageous and spirited family to which I have the honour of belonging. If a breach be made in the hill, in a second or two a soldier comes out and reconnoitres the ground. Should no further attack be made, he retires again; but, if the blows be

repeated, he returns, followed by a large body of his companions-in-arms, who run about in every direction, biting every thing that comes in their way,—for, as they are blind, they cannot discover their foe. They continue rushing about till nearly half an hour after all disturbance has ceased, when the majority of them retire to their castles, and are succeeded by the labourers, each with a lump of prepared clay in his mouth to repair the damage which the hill has suffered. You may see thousands and thousands thus employed; yet they never quarrel or get in each others' way; and they work with such speed and exactness that in an hour or two every thing appears in as perfect order as before. While the labourers are thus occupied, a single soldier may be seen leisurely sauntering about, without offering to assist. At intervals of a minute or two, however, he lifts up his head and beats his forceps against the building, producing a sound somewhat like the ticking of a clock, upon which a loud hiss is heard and the labourers redouble their exertions. Should the hill be again attacked before the breach is filled, the labourers

retire in a body, the soldiers appear, and the scene is acted over again. When the termites are upon the march, the soldiers act as sentinels and commanding officers, and may be seen at some distance before and upon each side of the main body, apparently exploring the ground; while others mount upon plants overhanging the road, from which they issue their words of command and encouragement, always responded to by a hiss upon the part of the labourers.

Jenny. What wonderful little creatures! I wish we had some of them in this country, that I might watch the soldiers commanding their regiments.

Dragon-Fly. You may be thankful that none of them have found their way here. You had better have all the cockroaches and moths in your county collected in the neighbourhood than one nest of white ants. How would you like to get up in the morning and find your father's and mother's picture and your own books and dolls nothing but a heap of dust?

Jenny. I should not like it at all. But do your friends the white ants do such things?

Dragon-Fly. They are, beyond all question, the most destructive to human property of any insects, and, I might almost say, of any creatures in the world, except perhaps the locust. They will frequently sink one of their tunnels under the foundations of a house, and, rising through the floor, entirely destroy the contents of the apartment, perhaps establishing a colony in the roof at the same time. They are very insidious in their attacks, and do a vast amount of mischief before their presence is at all suspected. Thus, they will make their way into a book-shelf and eat away all the inside of the board without touching the outside at all; and, as they have the sense to leave enough of the fibre to hold the two sides together, you would never think that any thing had happened to it, unless you touched it, when it would all fall into dust. If there are books upon the shelf, they are treated in the same way; and many are the fine libraries destroyed by them. Sometimes, as I said, they establish their colonies in the roof, in which case, instead of leaving the supporting-parts mere empty shells, as they do the other timbers of the house, they fill them

with their prepared clay or mortar, which soon becomes as hard as stone.

Jenny. If those are their habits, I am sure I am heartily glad that they are confined to hot countries. But do they eat every thing?

Dragon-Fly. Every thing you can think of, —clothes, leather, paper: nothing comes amiss to them. They will devour the contents of a trunk in a single night, so that in the morning it will be found to contain nothing but dust and fragments. They have been known entirely to destroy pipes of wine and spirits; and even great ships have been rendered entirely unfit for service by a few of these little creatures finding their way on board. Oh, your men are very grand, and boast of being the kings of the earth, and all that; but I should like to know what right they have to assume the title, when they cannot protect their most valuable property from such little, feeble creatures as the white ants?

Jenny. It is rather humbling to human pride, to-be-sure. But you mentioned some white ants in France. Are they equally destructive?

Dragon-Fly. No; they do very little mis-

chief except to growing timber, in which they make their nests, eating out the soft wood immediately under the bark, which is necessary to the life of the tree.

Jenny. I think you mentioned another French relative of your's,—*Formica leo* I think you called him. I should like very much to hear of him, if you are not in a hurry to go.

Dragon-Fly. Not at all, Miss Jenny: I am glad you find my conversation agreeable. Yes, my French cousin is a very ingenious and curious person. *Formica leo* is his Latin name; but you may, if you please, call him ant-lion,—which means the same thing. He is so called because he is very destructive to ants, which are his principal food,—though he is not averse to a good fat spider or blue-bottle fly, if it should come in his way.

Jenny. It is a pity he could not come here and get some of the dead flies which are lying all over the garden and wood-house. He should be welcome to as many as he wanted.

Dragon-Fly. He would thank you for nothing, my dear. He has so much of the lion about him that he will eat no game which he

has not killed himself. If you should see him, you would think this disposition of his condemned him to perpetual starvation. He is only about half an inch long, with a clumsy, soft body, shaped something like an old-fashioned flat-iron, and very short legs; and, to add to his other disadvantages, he can only walk backward, and that at a very slow rate. Now, how do you suppose he is going to supply himself with enough of the nimble, swift-running ants to keep life in his awkward body?

Jenny. I suppose he makes some kind of trap or snare.

Dragon-Fly. You are right in your supposition: and a very curious trap it is. As soon as he is hatched, (for you must know that only in his larva state is he thus ingenious,) he seeks out a spot of low dry sand at the foot of a tree or near some old wall, in order to be in the way of his favourite game, which (as he knows very well) frequent such places in search of food. There he traces out a circle with great exactness, which is to determine the size of his future abode; and then, placing himself inside the furrow, he thrusts the hinder part of his

body under the sand, and with one of his strong fore-legs piles a load of it upon his head, and then by a sudden jerk deposits it outside the circle. Then he takes a step backward; and, having thus ploughed up a little more, he throws up another load, never failing to put it entirely out of his way. Thus he traverses his limits in a short time,—when, having arrived at the place where he set out, he turns about and proceeds the other way, in order that each fore-leg may have a fair share of the labour. He continues these labours till he has excavated a conical hole about two inches deep, three inches wide at the top, and narrowing to a point at the bottom. The sides of the pit are perfectly smooth, and, being composed of fine sand, afford very little footing to any insect that comes upon it.

Jenny. But suppose your cousin should find stones in his digging: what does he do then? I should think it would spoil his pit.

Dragon-Fly. It would, if allowed to remain, as it would give the ants a foothold and enable them to scramble out. If the stones are very small, he elevates them upon his head and jerks

them out without much trouble ; but sometimes the pebble is too large and too near the bottom to admit of being disposed of in this way. When this is the case, he pushes his head under the stone, and, getting it balanced upon his back, walks carefully up the ascent and deposits it upon the outside of the circle. When the stone is round and of considerable size, you may imagine that the task becomes a difficult one. Oftentimes, when he has almost conquered the steep ascent, the treacherous stone will be dislodged by some jolt or jar, and, despite all the efforts of its bearer, away it will slide to the bottom again.

Jenny. Poor little lion! What does he do then?

Dragon-Fly. He is not discouraged, but tries again and again, adroitly making use of the channel or furrow formed by the rolling stone; and it is not till eight or ten attempts have shown the thing to be impossible that he gives the matter up as hopeless and makes another nest.

Jenny. What a persevering little creature! I am sure I should want to help him if I were

there. It is so discouraging to try to do something that you want to accomplish very much, and fail every time. I always feel as though I wanted to give up at the third trial, if not before.

Dragon-Fly. Here you may learn a lesson from the ant-lion, my dear. Why, even I, who do not pride myself upon industry and that sort of thing, never give up the chase of a fly so long as there appears to be any reasonable probability of success. But we will suppose that our ant-lion has not met with any misfortune or hindrance, and that his pit is neatly finished. The little lion now takes his station at the bottom, and, in order that his appearance, which is not very inviting, may not scare the passers-by, he covers all but the tips of his strong forceps with sand, and patiently waits for his game to come along. He does not usually have to wait a great while. Some busy ant, prying here and there,—as their custom is, you know,—comes across the pit, and, thinking it is the entrance to some newly-discovered country, boldly ventures down. But he pays dearly for his curiosity: the treacherous sand slides

from under his feet, and in a moment he is in the grasp of his enemy. It sometimes happens, however, that an ant lighter or more nimble than his fellows stops in his descent midway and scrambles up again as fast as he can; but he does not escape so. With wonderful quickness, the ant-lion shovels a load of sand upon his head, and, flinging it after his escaping game, seldom fails to bring it headlong back again. As soon as he has sucked the body dry, he flings it as far as he can out of his den,—for he knows very well that it would soon create suspicions if his house were seen surrounded by carcasses.

Jenny. Poor little ants! I cannot help being sorry for them,—though, after all, they have nothing to say, for they themselves devour all the insects they can catch. But does your cousin eat only ants?

Dragon-Fly. I never heard that any insect came amiss to him, though, as I said, he will eat nothing that he does not kill himself, however hungry he may be. But you can easily see that winged insects have a much better chance of escape, and even his well-directed

showers of sand do not always avail against them.

Jenny. How long does he remain in this state?

Dragon-Fly. About two years. He then makes a private apartment under the ground, which he lines with a beautiful silken curtain, and in which he changes into a chrysalis. In about six weeks he comes forth, no longer a clumsy, heavy creature, taking his prey by stratagem, but a beautiful four-winged fly, like myself, capable of open warfare,—and very successful in it, too.

Jenny. It seems to me, Captain Dragon-Fly, that all your family are rather destructive in their dispositions. You yourself kill insects both in their larva and perfect state; so does your cousin ant-lion; and the termites seem to destroy every thing that comes in their way.

Dragon-Fly. Well, child, and what of that? We are as we are made; and I doubt whether, after all, we are more destructive than you human creatures. I am told that all the sheep and oxen which we see in the fields are destined to be eaten up some day, and so are the

ducks and geese that live about our river. Moreover, we only kill just what we want to eat, and that in the most merciful way; while men hunt and fish just for the fun of it. The other day I saw a gentleman down by our river pulling up the little perch and sunfish by means of a sharp hook with a live worm upon it, which the silly creatures swallowed, and then leaving them to die in the bottom of his boat. A little while after, I was hovering over his garden, which is not very far off, and I heard him say to his little son, "Tommy, you must not kill the butterflies: that is very naughty and cruel." I thought it was too, so long as he did not want to eat them; but it did appear to me that Tommy must be rather puzzled as to the consistency of the reproof, if he happened to think about it.

Jenny. I think so too. I never could see how people can fish for fun: it always seems to me very cruel fun. I often wish that people could live without eating meat at all; but I suppose it must be best as it is.

Dragon-Fly. And so do I. Well, Miss Jenny, I have spent a very pleasant hour in

your company. I must go now, for it is getting late; but, if you will come down to the river to-morrow, I can promise you a very pretty sight, if it should happen to be a sunny day. You will see plenty of dragon-flies and many other insects; and they appear to much greater advantage over the water than anywhere else. Good-by.

1



3



2



- 1 Telescope Fly, *Diopsis Ichneumonina*, Bengal.
 2 *Centrotus Bi-clavatus*, Brazil
 3 *Centris Grossa* Wild Bee of Jamaica.

CHAPTER IX.

TWO-WINGED INSECTS.

Jenny. You may buzz away just as much as you please round the outside of the mosquito-bars, sir, but you cannot get in if you try ever so hard.

Mosquito. I don't care any thing about getting in, Miss Jenny. I am not one of the biting kind of mosquitos, and only buzz for the sake of enjoying my own music.

Jenny. I thought all musquitos were biters. I am sure all that we have in this neighbourhood both bite and buzz.

Mosquito. You are mistaken in that,—though it is a very natural error, I allow. All our females bite; and, as they are much more numerous than the others, they give the character to the race. For myself, I never taste

blood, and only now and then the juices of a flower. I admit that my female relatives *do* bite with a vengeance, and it is no great wonder that so many are put to death, or that the innoeent are punished with the guilty,—that is, if any one of them can be eonsidered guilty.

Jenny. Well, I am sure no one can be blamed for killing them. They are the most vexatious and provoking of all living ereatures. It is not only their bite,—though that is bad enough,—but their teasing hum is so perfectly intolerable, especially as one is going to sleep. There was a gentleman here the other day who had been a great deal in Afriea, and he told father that, though he had gone to sleep and slept soundly many a time with lions prowling about in the neighbourhood, two or three mosquitos would keep him awake all night. I do not see what pleasure they can take in making themselves so disagreeable.

Mosquito. You are mistaken, Miss Jenny, if you think they bite for the mere pleasure of doing mischief. It is the only way they have of getting a living.

Jenny. And how does that help them to get a living?

Mosquito. Why, they live upon the blood they suck out of your veins, just as bees and butterflies do upon the honey they extract from plants. Does not that make them seem a little more excusable?

Jenny. I don't know: perhaps it may. But, pray, what do all the mosquitos live upon that one finds in the woods? There are certainly very few people or animals for them to bite there.

Mosquito. I cannot tell you. It is one of the subjects that lie out of my reach; but you may observe that they are always very hungry in such situations, and present their bills with great eagerness to every one that comes. I have heard it said that they extract the juices of plants when they are unable to get blood; but, as I never saw any one doing it, I am rather doubtful about it.

Jenny. How do they bite? I never could understand that part of their ways. It does not appear as if their long tubes, or suckers, or

whatever they are, could be sharp enough to make such a wound.

Mosquito. Nor would the trunk alone; but you must know that this trunk consists of a tube containing five or six lancets of exceeding sharpness. When the mosquito settles upon your hand, for instance, she inserts and withdraws the lancets several times, till she makes a hole large enough for the blood to flow, which she then sucks through the tubes. That which makes the bite so painful is the saliva of the mosquito, which she introduces to make the blood flow more freely. It is said that if you allow her to take her fill the bite will not be painful.

Jenny. That is not the case with mosquitos here, at any rate; for I have tried it several times, and it is just as bad.

Mosquito. But tell me, is it true that they can bite through a leathern boot?

Jenny. I cannot say about the leather; but I know they can make themselves felt through a tolerably thick morocco shoe, and a kid glove is no protection at all. Whether they can bite through a copper kettle, as I

have heard, I should think was doubtful. They never go through the mosquito-bars,—which seems curious to me, for the threads are wide enough apart to admit them, and I should think they could crawl through them easily enough. I am sure I am glad they do not. It is something to be able to sleep in peace; but I think it is rather hard that they should spoil all the pleasure of sitting out in the summer evenings and walking in the woods.

Mosquito. But you can tell nothing about the torment of mosquitos in this country. You should go to South America to know what they really are. There some regions are so infested with them that the poor people can only sleep with their heads enveloped in cloths and their bodies buried three or four inches deep in the sand. Some of them make little contrivances called hornitos, which are small rooms without doors or windows, into which they creep through a very small opening and then fill them with the smoke of redwood and gum-copal. There are several different kinds of stinging insects, which, as it were, mount guard at different times of the day, relieving each

other at certain intervals; and it is said that the people of the country can tell the hour with tolerable exactness by the humming of their different tormentors. Between the coming and going of the different kinds there is usually a short interval of quietness, which the people take advantage of to obtain a little repose.

Jenny. Whata horrible country! Who can be so foolish as to live there?

Mosquito. The Indians of the country, who have been used to them all their lives, do not mind them; and missionaries have been known to endure their torments till their bodies were covered with marks,—for each bite leaves an indelible scar. When an unfortunate monk incurs the displeasure of his superior, he is exiled to some place more than usually infested with insects; and this they call being condemned to the mosquitos. It is believed that the insects are thickest near the surface of the ground, and for this reason the missionaries construct apartments upon stages elevated ten or twelve feet above the earth, where they are able to breathe more freely.

Jenny. I am sure it is very good in the mis-

sionaries to stay in such places for the sake of teaching the poor heathen. But is there no way of getting rid of these plagues or preventing their bites?

Mosquito. None has been discovered. The Indians paint their bodies with annatto and other things and smear them with grease, but it does little good. The nearer they come to the borders of the rivers, the worse are the mosquitos; and it is said that even the Indians who are supposed to be converted to Christianity will often forsake the mission-villages and return to their wild life, because the insects are not so troublesome in the thick forests.

Jenny. I have always wanted to visit warm countries and see the splendid flowers and trees and the beautiful birds of those regions; but, if it is as you say, I would rather go to the North Pole,—or, at least, to Lapland or Norway.

Mosquito. You would not get away from stinging insects in that direction. As far as any one has ever been to the north, gnats and sandflies are found in abundance, and greatly distress the travellers in those regions. In Canada

they abound in immense numbers. Sand-flies, —which, happily, are almost unknown here,—gnats, mosquitos, and, worse than all, the black flies, combine to torment the traveller; and often, in spite of waving boughs, smoke, and other preventive measures, his hands, face and neck will be streaming with blood or swelled to twice their proper size from their attacks.

Jenny. What are sand-flies? I do not think I ever heard of them.

Mosquito. They are very small insects,—smaller than a grain of sand,—and so fierce in their attacks that nothing can keep them off. The Canadians call them *brulôts*, which signifies firebrands or sparks, from the burning quality of their bites. Nets, or even thick clothes, are no protection against them, as their tiny bodies go through the smallest crevice, and, as they are almost invisible, it is very difficult to kill them. Many people think them worse than the worst mosquitos.

Jenny. I am very glad there are none of them here. What are those insects which one sees dancing about in the air in such multitudes towards the end of summer and in the

fall? They look very much like mosquitos, but they do not seem to bite.

Mosquito. They are not mosquitos, but gnats or midges, and are, I believe, perfectly harmless. They are very merry creatures, and enjoy their short lives as much, perhaps, as any animal whatever. They usually begin their merry dances about four o'clock in the afternoon and continue them till after sunset, flying up and down, round and round, in never-ending mazes,—seemingly for no other end than to enjoy their own rapid motions. It is believed that only the males join in these dances, the females remaining modestly concealed in the leaves and grass. Some of these gnats have beautifully-feathered antennæ, like ostrich-plumes, and their wings reflect all the colours of the rainbow. There is a white variety, smaller than these last, which is to be found all winter in sheltered situations, seeming to enjoy their dances over the snow as much as their brothers do their assemblies in the warm autumn sunshine.

Jenny. Where do mosquitos come from, in

the first place? for I suppose they have a larva state, like all other insects.

Mosquito. Have you never seen what are called wrigglers, or wigglers, in rain-water?

Jenny. Yes, often,—and amused myself with watching their queer motions.

Mosquito. Those are the young, or larvæ, of mosquitos. The female mosquito lays her eggs in the water, where they are hatched out into these little wrigglers, which live in this state some time. When he is about to transform, the mosquito bursts the skin of the wriggler and draws himself out by degrees; and you may often see him seated in his old skin, like an Indian in his canoe, and sailing upon the surface of the water. But this is a time of the greatest peril to the little navigator; for should the least breeze arise he will infallibly be upset, and drowned in the element where he has spent his whole life heretofore. Should nothing adverse happen, however, he extricates himself by degrees from his dangerous boat, and, spreading his filmy wings, takes flight to the nearest resting-place, there to remain till

the evening calls him abroad to feed and enjoy himself. Thus, people who have open eisterns or pools of stagnant water about their premises must expect an abundance of such visitors.

Jenny. What are the black flies of which you were speaking? Are they a kind of mosquito?

Mosquito. No: they are more like the house-flies, but only about two-thirds as large, rather darker in colour, and having white spots upon the legs. They are much more violent and bloodthirsty in their attacks, and their bite produces a wound from which the blood flows quite freely. Unlike the mosquitos, they are fond of high and dry places, and care very little for the wind, which drives the former away. They are found in great abundance about the shores and inlets of Lake Superior; and some of the copper-mining stations are rendered almost uninhabitable by them in summer. Happily, they all disappear at dark. These black flies abound in Canada, and are said to be worse as you go northward.

Jenny. There are some flies here which bite sharply enough. I have had them sting my ankles in church, so that it felt like the prick of a pin; and sometimes they even draw blood. What are they?

Mosquito. I presume it was one of the same kind of fly which troubles horses so much. It is provided with a curious and formidable apparatus of lancets and tubes, with which it pierces the veins and extracts often several drops of blood at a time. They torment horses and cattle to an incredible degree, often driving them quite wild with the pain of their stings and rendering them perfectly unmanageable. I dare say you have noticed how horses stamp and shake their heads in warm weather in order to drive them away. Some of them only bite for the sake of the blood, and they are sufficiently to be feared; but there are others much worse, which pierce the skin in order to deposit their eggs. The female makes a hole in the hide of the ox, and lays her eggs under it in the flesh, thus producing severe pain and giving great alarm to the poor

creature, who lashes his back with his tail in vain in order to get rid of his tormentor, who will never leave him till his work is done. It is to avoid this pest that the ox and cow resort to the water, whither the fly never follows them. When the larva is hatched, it makes a large open sore under the skin, in which it lives and undergoes its transformation, and which does not heal up till the perfect insect makes its escape. It is said that tanners prefer those skins which have these fly-holes in them, as the fly only attacks the strongest and healthiest animals. There are a good many different species of these insects, one of which, found in the neighbourhood of forests in England, is without wings, and possesses a skin so hard that it can be killed with great difficulty.

Jenny. Poor oxen! It seems a pity that some way could not be found to protect them from their enemies.

Mosquito. I believe none has been discovered. But the specimens we have in this country are nothing to those which infest

other regions of the globe. What do you think of a little fly causing a whole nation to emigrate regularly every year from fertile pastures to desert sands?

Jenny. I should think it was very wonderful. But is there any such fly?

Mosquito. Yes,—in the eastern part of Africa, south of the Red Sea. In those places, as soon as the rainy season commences, the inhabitants leave their fertile lands, and, with their cattle, hasten to the nearest tract of sand, in order to avoid the attacks of a small fly called the zimb. As soon as the buzzing of this pest is heard, the cattle and horses forsake their food and run wildly about, bellowing with fear and pain, till they die of exhaustion. There is nothing to be done but to get out of the way as soon as possible, since every bite produces a large swelling, which bursts open and mortifies, and soon destroys the life even of the largest camel. The thick-skinned elephant and the rhinoceros, whose hide will turn a pistol-bullet, are not secure from the stings of the zimb; and, as

the immense amount of food and water which they require prevents them from removing to the desert, their only resource is to roll themselves in the mud and allow it to harden upon their skins, thus clothing themselves with a kind of armour,—which, nevertheless, is not always sufficient to protect them. At the close of the rainy season the zimb disappears, and then the inhabitants return to their homes again.

Jenny. I do not see why people should continue to live in such places.

Mosquito. Why, I suppose they become used to it. There is no country which has not its disadvantages,—very great ones, too; and yet I believe there are no people who do not love their own country. The Arabs like their sandy deserts, and will not even sleep a night in a town if they can help it; the Norwegians wonder how any one can bear to live anywhere else than in Norway; the Swiss suffer agonies of home-sickness when they leave their rocks and mountains; and the Esquimaux, it is said, actually die of it if

taken away from their ice-fields and unmelting snows.

Jenny. Well, I am sure it is an excellent thing that people do like their own countries. What would become of these nations if they were all discontented and wanted to live somewhere else?

Mosquito. I suppose some parts of the earth would be overcrowded with inhabitants and others left desolate. No doubt it is best as it is.

Jenny. Is there any other country where the insects are as troublesome as those in Africa?

Mosquito. There is a fly found in Hungary, in the North of Italy, and sometimes even in France, which would seem to be almost as bad. It is very small, not so large as a mosquito, but much more formidable. It appears in certain seasons of the year in immense clouds and attacks the cattle, penetrating their noses, ears and other sensitive parts, and by its poisonous bite destroys them in a few hours. They sometimes attack human beings, espe-

cially children, causing severe pain and sickness and even death. As soon as it makes its appearance, the herdsman hastens to shut up his cattle in the cow-houses; or, if he is too far from home for this, he kindles large fires, the smoke of which drives away the flies. The cattle are said to be sensible of the beneficial effects of these fires, and, as soon as they find themselves attacked, they crowd into the smoke in great numbers and are thus preserved.

Jenny. Our common house-flies are disagreeable creatures enough. What torments they are when one is busy or reading, and especially longing to go to sleep! They never leave one alone a moment, and are almost as provoking as mosquitos, with their constant humming, buzzing and tickling. I have often wished that there was nothing like a fly in the world.

Mosquito. If you could have your wish, you would probably do a great deal of mischief; for flies are as useful in their way as any insects whatever.

Jenny. How are they useful?

Mosquito. Chiefly by destroying tainted and putrefying animal substance. There are one or two species particularly adapted to this purpose: I mean the blue-bottle and the blow-fly, or flesh-fly, which lay their eggs or deposit their young in decaying meat. The young maggots—as they are called—devour the substance in which they are laid with great rapidity, and thus render it harmless; whereas, if it were permitted to decay slowly, it would fill the air with very unpleasant and even poisonous smells and gases. The most terrible typhus fevers are produced in this way; and it has lately been said by some eminent physicians that scarlet fever is owing to the same cause.

Jenny. But the common house-flies are not blue-bottles.

Mosquito. No; but they are produced in much the same way, and you know they devour in their perfect state a great deal of waste matter.

Jenny. Yes; and I know that they waste a

great deal that they do not devour. After all, they are pretty little things enough, with their large eyes and bright gauzy wings; and, if there were as few of them as there are of beetles and butterflies, one would not care for them. It is only the immense quantities of them that make them so troublesome and disagreeable.

Mosquito. A good deal may be done to keep them out by care and attention, by keeping food closely covered and the rooms somewhat darkened, and by driving them out now and then. It is said, too, that strings of packthread stretched across the window about an inch apart will prevent them from entering even a well-lighted room, if the light be admitted only at one side. I do not know whether this is true; but it is at least worth trying.

Jenny. What is that long-bodied, long-legged insect upon the window? It looks a good deal like a mosquito, only much larger, and has eyes bigger than his whole head. Is it a relative of your's?

Mosquito. It belongs to the same order,—that is, the Diptera, or two-winged insects,—but there is no other connection. It has a great variety of popular names,—such as Harry Long-legs, Jenny Spinner, and mosquito-hawk,—all derived from some peculiarity in its manners or appearance. Thus, it is called ham-fly, from the length of its legs, and Harry Long-legs for the same reason

Jenny. Why is it called Jenny Spinner?

Mosquito. From its manner of disposing of its eggs. The female is armed with a long borer, and when she wishes to provide for her young she seeks out a piece of fine turf, when, placing the sharp end of her gimlet on the ground and spinning round and round, she bores a hole deep enough to protect her eggs from injury. She then deposits them by means of the same instrument, and, having covered them up safely, leaves them to take their chance.

Jenny. And why are they called mosquito-hawks?

Mosquito. I suppose because they have such

a resemblance to mosquitos and yet are so much larger.

Jenny. I supposed perhaps they caught mosquitos, as hawks do other birds.

Mosquito. No: I believe they eat nothing but the juices of flowers, and very little even of that. They are harmless, gentle creatures, and very short-lived,—as, indeed, all our family are. But we make it up in numbers; for there are probably more individuals of this order existing at one time in this world than of all other orders put together. There is no part of the world where they are not found, and always in immense numbers.

Jenny. There is one thing that has always puzzled me about flies, and that is, how they contrive to walk upon smooth upright glass, and even upon the ceiling, with their backs downward. I should think they would fall off by their own weight.

Mosquito. Ah, that is another of the mysteries. It is generally conceded that they do it by means of some particular machinery about their feet; but “doctors disagree” widely

as to *how* they do it. Some people say that the foot acts like the suckers of leather which you see the boys have, and by means of which they carry stones and other things. This was the generally-received opinion for a long time; but latterly it has been disputed by people who have examined the fly's foot very particularly and they say that it is quite impossible that it should be applied to the glass closely enough to produce such an effect. Others say that even upon the smoothest glass there are inequalities large enough for the tiny claws of the fly to take hold of, and it is by means of these that he sustains himself. Others, again, declare that the fly's foot secretes a sticky fluid, which holds fast to the glass, as your shoes might do to a smooth board if you were to rub the soles with tar or molasses. You may take any one of these opinions that you please; for they are all sustained by excellent authority. But what is the use of talking to a little girl who is fast asleep? I believe I will fly out into the garden and have a dance with my brothers, if I can find

any of them; for if I stay here till morning I shall probably fall a sacrifice to the bad name which has been given to the family by the bloodthirsty propensities of my female relatives.

Whoever is fond of terrible stories of mosquitos can find plenty of them in books of travels. Dr. Clarke—who journeyed through Russia in the time of the Emperor Paul, and whose travels are exceedingly interesting, containing among other things a very full and particular description of the Crimea, since become so famous—gives terrible accounts of the mosquitos in the neighbourhood of this peninsula. His body and that of his companions were completely covered with the bites of those horrible plagues, so that the pain and irritation actually threw them into a fever. At one time he sought shelter in their close travelling-carriage; and, though the night was terribly hot and sultry, he dared not open a window. At last he succeeded in lighting a lamp, but had no sooner done so

than it was surrounded by such swarms of mosquitos that they positively filled the glass chimney. The Russian soldiers are obliged to sleep in sacks made for the purpose; and even this precaution is not always sufficient, since, as Dr. Clarke relates, several of them died from the effects of the bites.

But in mosquito-stories the great Baron Humboldt must bear the palm away from all competitors. He found the rivers of South America, especially the Orinoco and its branches, so infested with several kinds of stinging insects as to make life almost unendurable. As related above, the different species appear at different times of the day, and at these moments of relieving guard there is a slight interval of repose. "When two persons meet in the morning, the usual salutation is, 'How have you found the zaneudos during the night? How are we off to-day for mosquitos?' These salutations," says the great traveller, "remind us of a Chinese form of politeness which indicates the ancient state of the country wherein it took its rise. Salutations were

made heretofore, in the Celestial Empire, in these words:—‘*Vou-to-hou!* have you been incommoded during the night by the serpents?’ The lower stratum of the air, to the height of fifteen or twenty feet, is absolutely filled with venomous insects. If in an obscure spot—for instance, in those grottos of the cataract formed by the blocks of granite—you direct your eyes towards the opening illumined by the sun, you see clouds of mosquitos more or less thick. ‘How comfortable people must be in the moon!’ said a Salive Indian to Father Gumilla: ‘she looks so beautiful and so clear that she must be free from mosquitos.’ At Mandoraua we found an old missionary, who told us, with an air of sadness, that he had had his twenty years of mosquitos in America. He desired us to look at his legs, that we might be able to tell one day, beyond sea, what the poor monks suffer in the forests of the Cassiquiare. Every sting leaving a small darkish-brown point, his legs were so speckled that it was difficult to recognise the whiteness of his skin through the spots of coagulated blood.”

The people resort to curious expedients to obtain some degree of quietness from their tormentors. "Thus, one of the most barbarous nations of the Orinoeos—that of the Ottomaes—is acquainted with the use of mosquito-curtains woven from the fibres of the Moriehu palm-tree. In the villages of the Rio Magdalena, the Indians often invited us to stretch ourselves, as they did, on ox-skins near the church in the middle of the Plaza Grande, or the Great Square, where they had assembled all the cows of the neighbourhood. The proximity of cattle gives some repose to man. The Indians of the Upper Oricono, and the Cassiquiare, seeing that Mr. Bonpland could not prepare his herbal, owing to the continual torments of the mosquitos, invited him to enter their ovens or hornitos. Thus they call little chambers, without doors or windows, into which they creep by a very low opening. When they have driven away the insects by means of a fire of wet brushwood, which emits a great smoke, they close the mouth of the oven. The absence of the mosquitos is purchased dearly enough by

the excessive heat of the stagnant air and the smoke of a torch of copal, which lights the oven during your stay in it. Mr. Bonpland, with courage and patience well worthy of praise, dried hundreds of plants shut up in these hornitos of the Indians." Think of that, little boys and girls who fret at the confinement of a large, airy school-room for a few hours a day! And, whenever you are tempted to refrain from some act of kindness or benevolence because it will give you some little trouble, remember the poor Father Gumilla and his twenty years of mosquitos. While we must wish that the teachings of these good men were more in accordance with the true spirit of the gospel, yet we cannot help admiring and desiring to emulate their patience and perseverance in striving, under every disadvantage of climate, surrounded by wild beasts and furious savages, and tormented day and night by venomous insects, to do some good to these people, who appear to be the most deeply degraded of human creatures, except perhaps the Australians.

These latter people have their share of the plague of flies, in the shape of abundance of gnats, and a small fly which attacks the eyes, producing a terrible inflammation called the fly-blight, by which many people—especially Europeans—lose their sight. I have been unable to find any particular description of these insects. In some late books about Australia they are frequently alluded to, and particular descriptions given of their habits and appearance.

The black fly, as mentioned above, is found in all the northern parts of North America, especially about the great lakes. It seems to be one of the worst of the race, to judge from the descriptions of travellers who have suffered from their attacks. "I have sat down to write," says one, "and have been obliged to throw away my pen in consequence of their irritating bite, which has obliged me every moment to raise my hand towards my ears, or mouth and eyes, in constant succession. When I could no longer write, I began to read, and was always obliged to keep one hand in con-

stant motion towards my head. Sometimes, in the course of a few moments, I would take half a dozen of my tormentors from my lips, between which I had caught them just as they perched."

The party who in 1848 visited Lake Superior in company with Professor Agassiz were desperately annoyed by these insects, which they describe as much worse than mosquitos. Mr. Cabot, the journalist of the party, says, "The pest of flies, which all the way had confined our ramblings pretty closely to the rocks and beach, and has been constantly growing worse and worse, has reached its climax. Although detained here nearly two days, we could only sit with folded hands, or employ ourselves in arranging our specimens, and in such other work as could be pursued in camp and under the protection of the smoke. One, whom scientific ardour tempted a little way up the river in a canoe after water-plants, came back a frightful spectacle, with blood-red rings round his eyes, his face bloody and covered with punctures. The next morning his head and

face were swollen from an attack of erysipelas." Bayard Taylor seems to have found something like it at Edalle on the Upper Nile. He describes it as "a small black fly, as venomous as the mosquito, and much more difficult to drive away." In short, wherever man has gone, there have these tormentors accompanied him, alloying the pleasure experienced in the most beautiful scenes and under the finest skies, and adding something to his discomfort on the barren sands or swampy rivers of the tropics, as well as in the inhospitable regions of eternal snow.

THE END.

